TECHNOLOGY DEPARTMENT

TELEPHONE ENGINEER and MANAGEMENT

NOVEMBER, 1947

Del Rio, TEXAS

Telephone directories for Del Rio, "Queen City of the Rio Grande", are published by the General Telephone Directory Company, publishers of telephone directories in more than 1,000 American Cities and Towns.

THIS colorful city on the banks of the lazy flowing Rio Grande is widely known as the "Wool and Mohair Capital of the United States." It is the gateway to the picturesque Southwest and Old Mexico lying across the river from Villa Acuna. The area surrounding Del Rio is rich in legends of the old West involving such colorful characters and places as old Judge Roy Bean and "The Jersey Lilly."

This land with its abundance of good hunting and fishing lures many sportsmen from the cities of El Paso, Dallas, Fort Worth and San Antonio which are all within driving distance.

The Del Rio and Winter Garden Telephone Company which serves Del Rio employs the complete directory publishing services of the General Telephone Directory Company. This telephone company along with every other telephone company in the country feels the responsibility of issuing an accurate, attractive telephone directory to each of its subscribers. These Telephone Companies are naturally interested in doing this at a minimum of expense.

It is in this regard that the advantages of our complete directory publishing services become apparent. We are proud of the record our organization has made in the directory publishing field both in the production of accurate, attractive directories and the increases in gross advertising revenues we have produced for Telephone Companies in more than 1,000 American Cities and Towns.

Our representative will be glad to call at your office and explain the benefits of our complete directory publishing service to you.

GENERAL TELEPHONE DIRECTORY COMPANY

EASTERN OFFICE: 185 NORTH WABASH AVENUE, CHICAGO 1, ILLINOIS, TELEPHONE STATE 5478

WESTERN OFFICE: PRESS-TELEGRAM BUILDING, LONG BEACH 12, CALIFORNIA, TELEPHONE 6-7221

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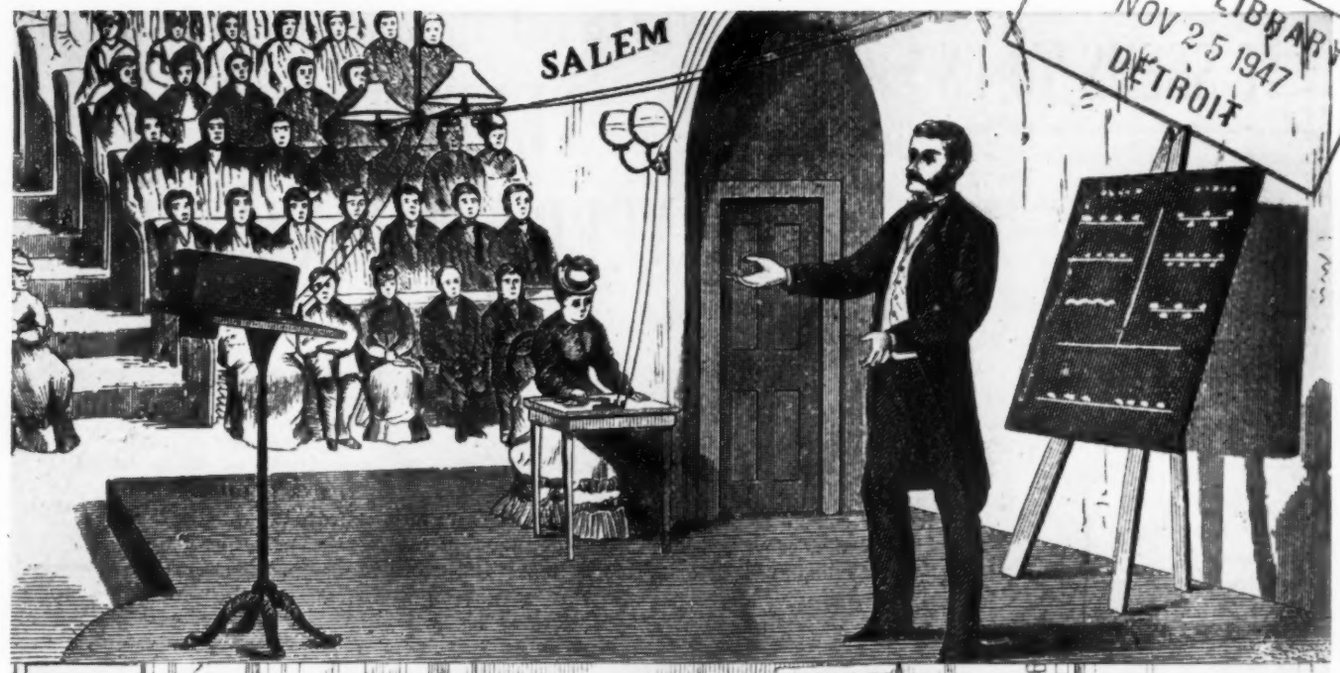

71 YEARS AGO THIS MONTH

The first two-way long distance call was made

Long distance demonstration made by Dr. Bell to Salem audience and "covered" by reporters in Boston, 14 miles away. From wood cuts which appeared in *Scientific American* at the time, and reproduced here through courtesy of Western Electric Company.

Within a few months after the telephone's first birthday, another "first" was recorded when the first two-way long distance conversation took place. It was made over telegraph wires between Boston and Salem on November 26, 1876. Early the next year this was followed by an equally impressive event. A public demonstration was made to the citizens of Salem by Dr. Bell through a "hook-up" between the lecture hall in Salem and his laboratory in Boston.

Telephone progress got off to a flying start. Within two years exchanges had been opened in 13 states. Before another year had passed 20 more states were added. Others soon followed, and the foundation of our present vast system had been laid. Today, telephone progress is advancing with greatly accelerated strides, in keeping with the industry's *Spirit of Service* and its tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exide Batteries have been proving themselves worthy of that trust.

Exide
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

IT SEEMS TO US

The fatal accident that took the life of our old friend WALT SCHRUPP, western division plant manager of the Central Telephone Co., Sioux Falls, S. Dak. came at a time when WALT was preparing to enter into his own venture in operating telephone property. The board of the Redwood County (Minn.) Telephone Co. just previous to his untimely death had voted to sell their property to Walter. We join the family and his many friends in condolences.

• • •

The words pink and red have almost lost their former meaning in the minds of present day newspaper readers so we hesitate to use that description of our ROY F. SMITH and DON C. SORENSEN when we viewed their faces after a recent fishing trip to the North Woods. DAN McNULTY, who accompanied them, was not as noncommital as ROY or DON as he frankly admitted he made the trip to rest up after the recent USITA national convention. You are right, no fish!

• • •

Friends of RAY KIERAN, Indiana Associated Telephone Co., Lafayette, Ind., are quite alarmed over the illness that has incapacitated him in recent months. RAY is well known in engineering circles in the United States and has many projects under way for his company.

• • •

When in Roanoke, Va. attending their convention last fortnight several of us noticed that the Washington (D. C.) Post in their issue of October 30 ran a news item to the effect that the USITA would hold their convention on October 14-16. Now we know that other editors are only human after all.

• • •

We were glad to see that our fisherman friend CHARLES W. BOUTIN, president and general manager of the Southeast Missouri Telephone Co., Cape Girardeau, was further honored in recent appointment to five member Misouri State Board of Mediation. CHARLIE will represent employers on board that will act in labor disputes arising in public utilities.

The National Telephone Magazine

TELEPHONE ENGINEER and MANAGEMENT

NOVEMBER 1947 **VOL. 51, NUMBER 11**

Editor, RAY W. SMITH • *Advertising Director*, ROY F. SMITH
Managing Editor, JOHN G. REYNOLDS • *Associate Editor*, JAY G. MITCHELL
Washington Bureau, ROLAND C. DAVIES and FRED HENCK
Promotion Manager, DON C. SORENSON • *Production Manager*, MARGARET INDIA
Circulation Manager, BERNADINE STEPHENS

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COVER: Like a cluster of glowing ice cubes, seeds of synthetic crystals are about to be lowered into a growing tank at Bell Telephone Laboratories where engineers have developed a method of culturing them as a substitute for scarce but heretofore indispensable quartz. In a few years such artificial crystals are expected to replace as much as 90 per cent of the natural quartz used in long-distance telephone systems.

Published monthly by TELEPHONE ENGINEER Publishing Corporation
7720 Sheridan Road - Phone Rogers Park 3040 - Chicago 26, Illinois
West Coast Representatives, BRAND & BRAND
1052 West 6th Street, Los Angeles, California
Copyright 1947 by Telephone Engineer Publ. Corp.

VOLUME 51, NUMBER 11. Published monthly by Telephone Engineer Publishing Corporation. Office of Publication, Pontiac, Illinois. Executive and Editorial Office, 7720 Sheridan Road, Chicago, Illinois. Subscription: U. S., Cuba, Mexico, $2.00 per year; Canada $2.50. in all other countries, $4.00. Single copies, U.S.A. 20 cents; single copy JANUARY 15 BLUE BOOK BUYERS' GUIDE $1.50. Entered as second class matter at the post office at Pontiac, Illinois, under the act of March 3, 1879.

"LINE DOWN on the Warrenville Road

—*the crew will be there pronto!*"

FILTHY weather, not fit for man or beast, but maintenance crews have to get there. A line can't stay down. And the Highway Maintenance Body, like the men who ride in it, is always prepared for emergency work—a place for all needed tools and materials, and everything in its place!

There's no accident about the efficiency of Highway equipment. Take that Maintenance body for instance—it is *organized* for quick convenience as a result of years of close familiarity with all the problems involved. It's the same way with all other Highway equipment.

Highway Earth Boring Machines do double duty as pole derricks, saving an extra truck and crew. Highway Pole Trailers and Cable Reel Trailers are designed to save time and manpower. Highway Winches and Power Take-offs have the enthusiastic approval of leading engineers. Highway's long and successful experience can provide answers for your particular needs. Write to us!

HIGHWAY TRAILER COMPANY

Manufacturers of: Utility Bodies • Winches • Earth Boring Machines • Pole and Cable Reel Trailers and other Public Utility Equipment.

General Offices: **EDGERTON, WISCONSIN, U.S.A.**

See this Relay....

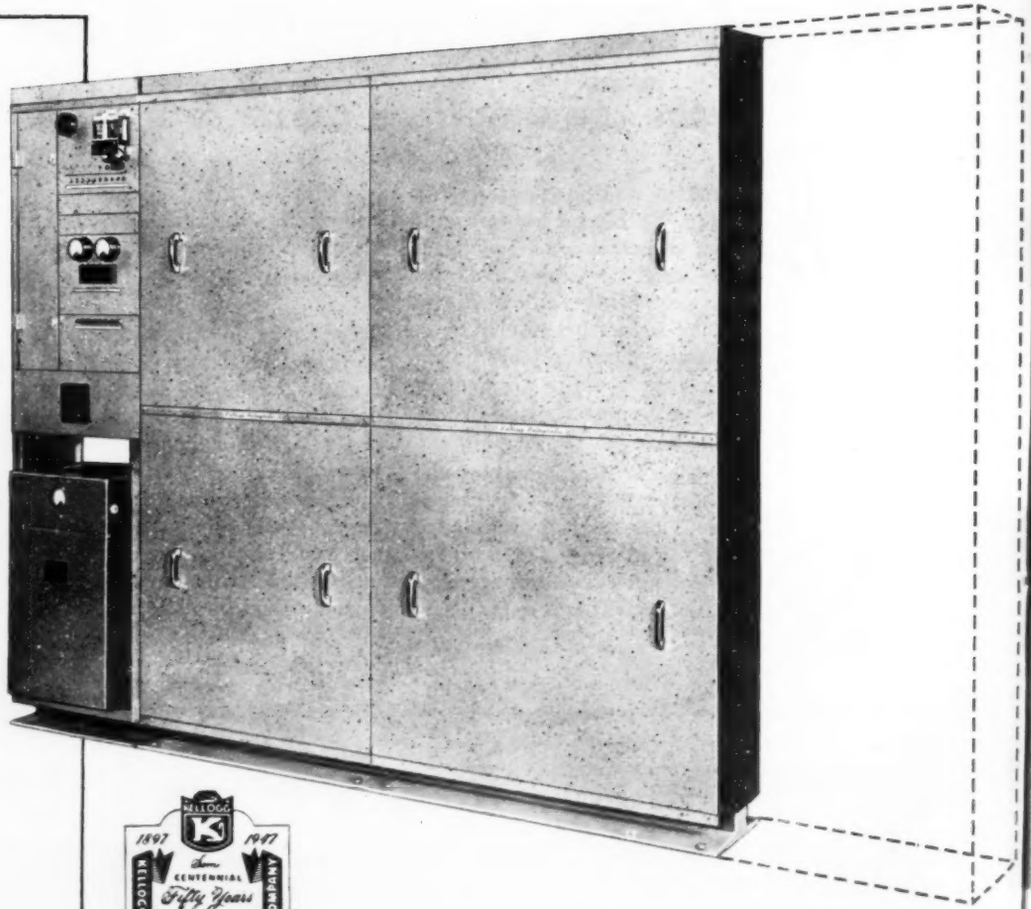
This typical relay of the simplified Relaymatic measures only 3"x4½"x 2⅛" overall. It's pictured here in actual size.

See How This New Relay Plus Simplified Wiring SAVES VALUABLE SPACE, CUTS COSTS

Everyone knows how high building construction cos'ts are now. Thus equipment such as the Relaymatic which can fit into a smaller space pays you an actual dollars and cents saving even before installation.

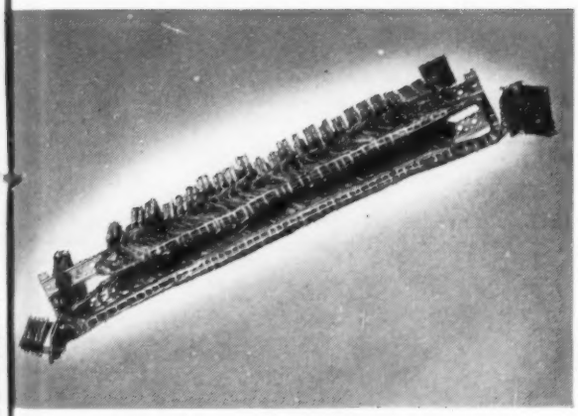
The new 100-line capacity unit requires 49 per cent less floor space than formerly required, as shown by the dotted line portion of the photograph at right. If you're planning construction of new buildings for telephone equipment, th's is a factor that you cannot afford to overlook.

Simplified wiring is another important feature of the Relaymatic. I:s design permits the addition of new lines or links as needed. These added units are available to you factory wired, completely tested and ready for mounting. You save expensive labor, costly interruptions of service.



KELLOGG
1897 1947
CENTENNIAL
Fifty Years
SERVICE AND PROGRESS
KELLOGG SWITCHBOARD AND SUPPLY COMPANY

IT'S THE HEART OF THE NEW, COMPACT, SIMPLIFIED KELLOGG RELAYMATIC



New Simplified Wiring Cuts Installation, Expansion Costs

Here's a close-up view of the compact wiring of the Relaymatic and the basically simple mounting arrangement which permits easy additions when needed. With the Relaymatic, you get the best there is in equipment for today, plus the assurance that you can meet tomorrow's needs as well.

Backed by 50 Years of Relay Engineering

Behind the relays used in the new Relaymatic are 50 years of relay designing, engineering and manufacturing experience. Relays are the key to efficient dial switchboards—successful operation depends entirely on relays. They must be right—and Kellogg relays have been right for half a century.

Yes, the relay pictured here is the "heart" of the new Relaymatic. Small enough to be held in the palm of a man's hand, it is one of the many reasons why the Relaymatic offers so many dollar saving advantages.

Because the relay is so much more compact, the Relaymatic occupies less floor space; cuts costs on construction of new buildings for equipment. A 100-line Relaymatic needs 49 per cent less floor space than before.

The relay itself is designed throughout for long life and efficient operation. Only the finest materials are used, plus workmanship such as only Kellogg experience can produce. Typical improvements are a new armature and armature retaining clip to make adjustment easy and positive. Leaf springs are of nickel silver, equipped with twin contacts of precious metal for additional operating dependability.

The new Relaymatic — simplified and more compact — answers every need of those seeking relay equipment for better service at lower cost. It gives you relay engineering at its best, plus many advantages which means dollars saved today.

Ask a Kellogg representative for more information on the Relaymatic today, or write —

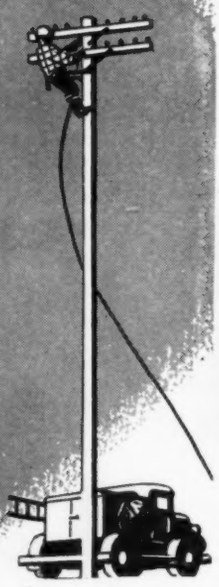
KELLOGG SWITCHBOARD & SUPPLY COMPANY
6650 SOUTH CICERO AVENUE • CHICAGO 38, ILLINOIS

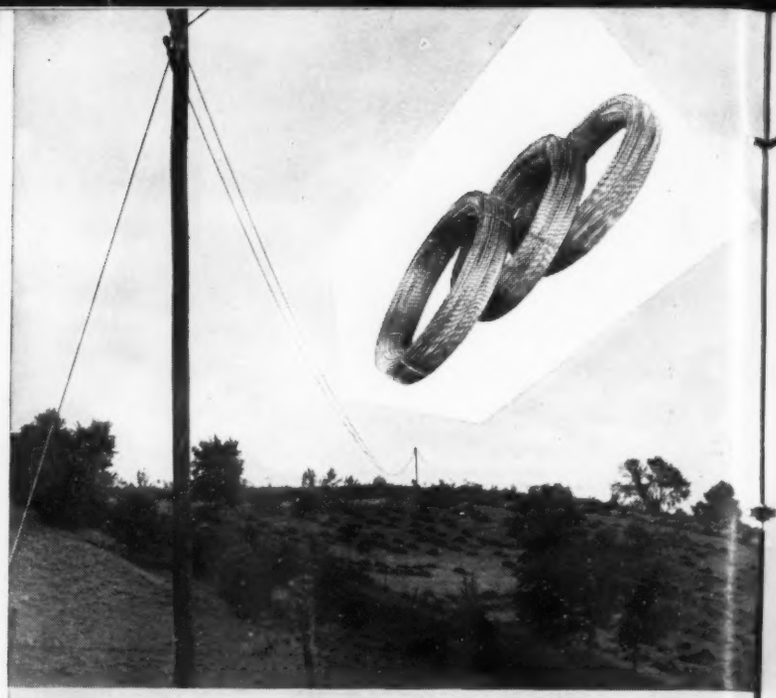
Have These Other Advantages, Too, With The New RELAYMATIC

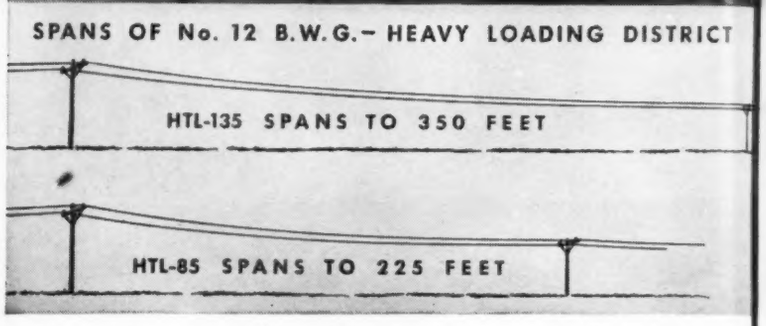
- Relaymatics provide for all the necessary features for inter-toll dialing that are now considered national standards.
- Available in Broadspan and Selector types for either unattended Community Dial Exchanges or larger attended Main Dial Exchanges.
- Relay operation throughout.
- Progressive allotment of idle connecting circuits.
- Lines in trouble automatically cut out.
- Revertive calls by directory numbers. Revertive calls do not tie up connecting circuits.
- Time limit on connections.

The Satisfaction Lasts When You Buy Products

Recommended and Guaranteed by KELLOGG

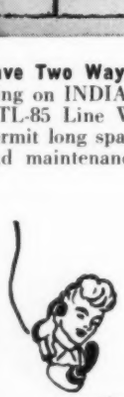






Save Two Ways on line wire replacement and construction by standardizing on INDIANA STEEL AND WIRE CO.'S Crapo HTL-135 and Crapo HTL-85 Line Wire. Because of their high tensile strength, these wires permit long spans, enable you to realize substantial savings in construction and maintenance costs. Galvanized by the famous Crapo Process.

More Lines, More Power. For the special needs of the Telephone Industry, in these days of service expansion, GOULD provides the famous Flote Battery in glass (illustrated), and in rubber and Vitrabloc jars. This different battery marks a major advance in design. It eliminates low cells in full float service, reduces maintenance costs, increases battery life.

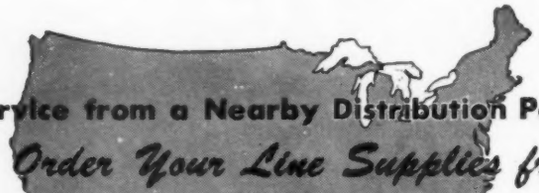


There's three-way satisfaction when you concentrate purchases of line supply and constuction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 100 strategically located distribution points.

KELLOGG SWITCHBOARD & SUPPLY COMPANY

Branch Offices: Kansas City, San Francisco, St. Paul, Los Angeles

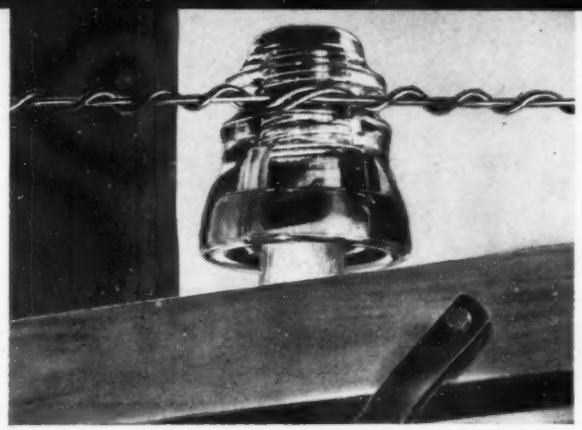
Factory and General Offices: 6650 S. Cicero Avenue, Chicago 38



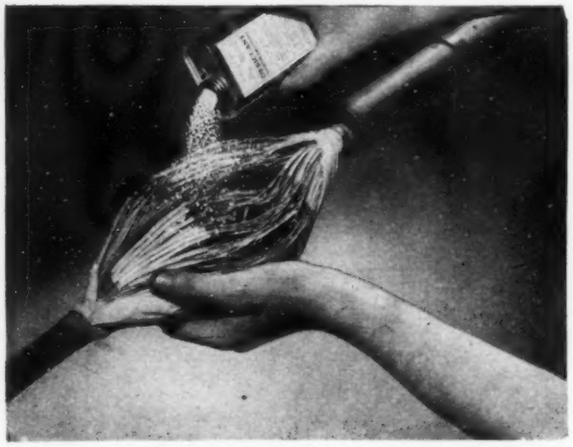
For Service from a Nearby Distribution Point

Order Your Line Supplies from

KELLOGG



Meet Every Service Need. That's why so many telephone companies use Armstrong Glass Insulators. Made by ARMSTRONG CORK CO., they feature crystal clarity of glass, accurate gauging, and unusual resistance to temperature changes. A good bet for reducing maintenance costs.

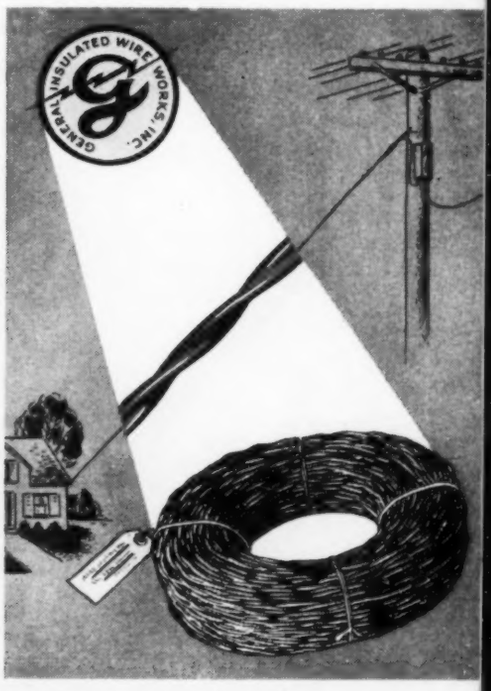


Drier Than the Driest Desert! The safe, easy way to dry splices in lead covered cables is to sprinkle Drierite Desiccant among the conductors. It makes the splices about the driest part of the cable. This W. A. HAMMOND DRIERITE COMPANY product won't harm conductors or insulation.

Sealed Against Trouble. Leading manufacturers of communication equipment rely on KESTER Rosin-Core Solder to eliminate high-resistance joints and intermittent open-and-closed circuits. It permanently seals joints and protects them against service troubles. Special plastic rosin flux used in the KESTER SOLDER CO. product does not cause corrosion or injure insulating materials.

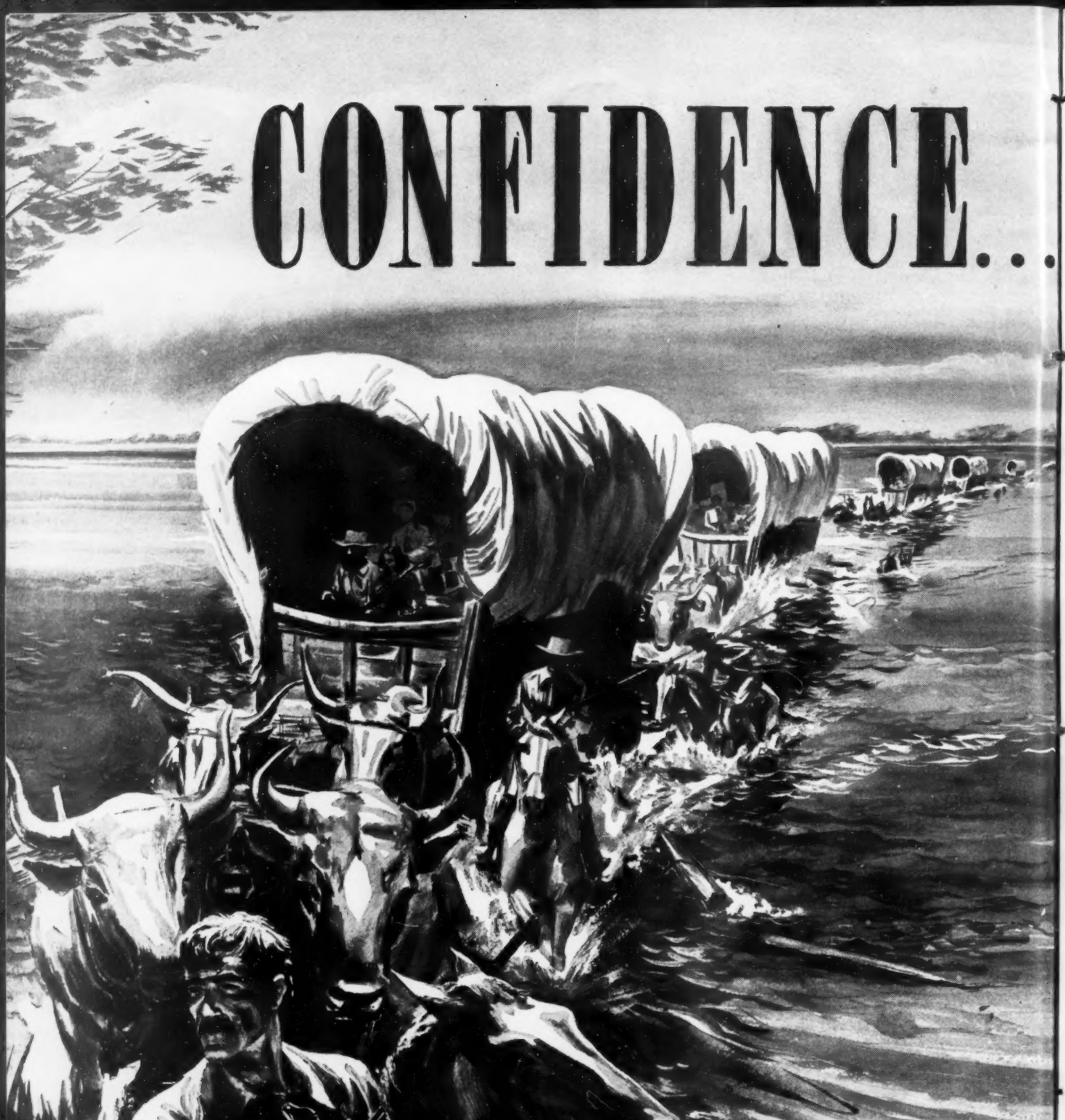
Neat, Precision Soldering is easy when you use a Vulcan Electric Soldering Iron. Made by VULCAN ELECTRIC CO., these irons give unimpaired heat production, last longer. Made in 15 sizes of screw and plug tip types—including the "Pygmy" tool, for delicate soldering.

Full Protection to guy strand plus added strength and life for the entire guy installation is yours when you use A. B. CHANCE CO. Thimbleye Guy Fixtures. The improved full, round Thimbleye prevents binding and kinking af the guy strand. The groove fits the strand more snugly and prevents flattening.



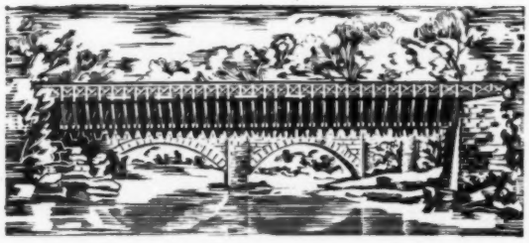
Increase Drop Wire Life 30% by using GENERAL INSULATED WIRE WORKS Bronze Drop Wire. This high-conductivity wire is drawn of solid non-corrosive bronze and covered with Neoprene, the insulation that can take punishment. Flexible—easily handled.

CONFIDENCE.....



Manufacturers of Wire Rope and Strand • Fittings • Slings • Screen, Hardware and Industrial Wire Cloth • Aerial Wire Rope Systems
Hard, Annealed or Tempered High and Low Carbon Fine and Specialty Wire, Flat Wire, Cold Rolled Strip and Cold Rolled Spring Steel • Ski Lifts

.....how much is it worth?



IN 1844, three years before Alexander Graham Bell was born, and long before the first Prairie-Schooner crossed the Mississippi River, John August Roebling's confidence in the suspension principle of construction so impressed the engineers of the State of Pennsylvania, that they authorized him to build the world's first suspension aqueduct.

How much is his confidence worth to all the thousands of engineers who followed and to humanity in general that have benefited from his pioneering venture?

And how much is the confidence of the John A. Roebling's Sons Company in the future of American industry worth to you, that keeps Roebling development and Roebling products in the lead?

Roebling's greatest asset is your confidence in Roebling and its confidence in your future. That is why Roebling's every effort is dedicated to the preservation of this confidence—your's and Roebling's.

CONFIDENCE IN ROEBLING . . . CONFIDENCE IN KELLOGG!

ROEBLING TELEPHONE CABLE is sold through Kellogg Switchboard and Supply Company for just one reason. We, here at Roebling, know that the Kellogg Company can offer you the finest telephone cable planning and engineering service available. We have the same confidence in Kellogg that we have in our product.

Through Kellogg you can buy Roebling Lead Encased Telephone Cable. It can be supplied with conductors of No. 19, No. 22 and No. 24 A.W.G. in sizes ranging from 5 pairs to 900 pairs.

Each conductor is paper insulated . . . each pair is color coded. Cabled together, they are paper taped and treated under controlled temperature and vacuum to remove moisture. Ordinarily the cable is sheathed with lead containing 1% antimony.

When the cable is to be used for direct burial, there can be added a jute protection against soil corrosion. For high mechanical protection, steel tape armor can be furnished.

Here is a typical example of a product of Roebling quality. For its most efficient use, contact Kellogg Switchboard & Supply Company, 6650 South Cicero Avenue, Chicago 38, Illinois.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY

Electrical Wire and Cable • Suspension Bridges and Cables
Aircord, Aircord Terminals and Air Controls • Lawn Mowers

ROEBLING

A CENTURY OF CONFIDENCE

Take Advantage of Mutual's Liquid Gas Field Equipment

- *Put Coveralls on Maintenance Dollars*

- No Moving Parts to Repair
- No Priming, Pumping or Generating
- No Coils to carbon-up
- No smoke or Odor
- Safety of Modern Fuel
- Maintenance Dollars reduced to a few cents.

Above are listed a few of the reasons why MUTUAL Liquid Gas Lead Melting Furnaces and Heating Torches are superior to makes which use slow, inefficient fuels. Liquid Gas vapors are drawn off from the liquid within the container by simply opening the valve. After lighting the vapor, place your six or eight inch lead pot on the furnace and within ten minutes 60 pounds of lead is melted (Using our No. 2 Furnace). Liquid Gas Fuels (Propane and Butane) are about half the weight of gasoline or kerosene. Flames can be adjusted from a blast (2300° F.) to candle flame.

It's Easier . . . Safer . . . Faster . . . More Economical

"ASK THE MAN USING MUTUAL LIQUID GAS FURNACES AND TORCHES"

Contact Your Nearest Supply House or Write Us Direct for MUTUAL'S NEW CATALOGUE T999

Mutual **LIQUID GAS EQUIPMENT CO., Inc.**
3600 WEST IMPERIAL HIGHWAY, INGLEWOOD, CALIF.

NEWSLETTER
TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*

ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

NEWSLETTERS *on Alternate Weeks*

November 15, 1947

Dear Sir:

Joseph A. Beirne, pres. of Communication Workers of America in appearance on Wage Hour legislation before House Education & Labor Committee, Oct. 27 emphasized his position that telephone companies are able to seek higher rates if their costs rise, declaring this puts telephone companies in favored position. Mr. Beirne argued that no basis for 500-station limitation had ever been established. He contended that number of stations in an exchange is no indication of its revenue-producing ability.

Rep. O. C. Fisher (D., Tex.) declared that he felt basis of minimum wage should be productivity rather than cost of living; he recalled testimony of Clyde S. Bailey, USITA exec. v. p., that per station revenues are much higher in Bell System than in Independents, and that large Independents have higher gross per telephone than smaller companies. Mr. Beirne replied that he was not familiar with those statistics, but he contended that in telephone business it is difficult to reconcile figures of one company's operations with those of another because of operating group ownership, separation of revenues, and other factors.

The CWA President said he had no figures on how many workers would be affected by raise to 75-cent minimum, but he noted that Bell System has no maximum rates of less than $30 weekly, and only four Bell companies have starting rates in major cities of less than that amount. Almost all Independents whose employees are represented by CWA have starting rates at less than 75 cents, he declared.

* * *

Installation of highway mobile radiotelephone equipment of Michigan Bell Co., with one station to be operated by Michigan Associated Tel. Co., in cooperation with Bell System company, nearing completion, with service to vehicles on U. S. Highway 10 between Detroit and Bay City expected to be available by early 1948.

Michigan Bell stations at Detroit, Flint and Saginaw are nearly complete; others at Jackson, Kalamazoo, Lansing, Grand Rapids, Port Huron and Sault Ste. Marie are in advanced stages of construction. Station at Muskegon will be operated by Michigan Associated Tel. Highway mobile system of Michigan Bell and Michigan Associated will be interconnected with landline systems; thus providing service from vehicles to all telephones in the country. Other stations are to be installed next year at Escanaba, Marquette and Houghton by Michigan Bell.

* * *

In order authorizing Pacific T. & T. rate boosts averaging approximately 14%, Washington Dept. of Public Utilities noted that

operating characteristics of telephone industry differ widely when compared to electric, gas or water utilities. Commission stated telephone industry provides communication service on local, intrastate, interstate and international scale not found in other utilities; described service as custom-made, personal service subject to rigid limitations in regard to diversity of use and flexibility. Order recognized fact that supplying telephone service results in ever-increasing amount of telephone plant investment and expense per station as number of subscribers within an area increases.

* * *

Special tax-advisory group headed by Roswell Magill on Nov. 4 introduced long range, free-enterprise, incentive tax program built on foundation of equitable income tax cuts for all. Harold Knutson, chairman of House Ways and Means Committee, said report would be used as basis for drafting long range tax bill.

Magill proposals, which also include community property system, consist of 46 major suggestions for changes in federal revenue laws. It agreed that big scale income taxes would be retained for some time, but said that since these levies would have to be heavy, greater care must be used to see that they are spread as fairly as possible over income producers in our population.

Program stated that excises should continue to form important part of federal revenue system, but inequities in particular levies should be eliminated. It made it clear that it did not believe that both corporate and individual income taxes generally should be lowered together.

* * *

Report of Rural Development Committee of Virginia Independent Tel. Assn., given at recent Virginia convention, revealed Independent companies in state added 2517 rural stations in 1946; 2113 during first six months 1947. Estimated $997,272 to be spent for rural expansion in '47. Virginia Independents estimate 4639 gain in rural telephones for '47. Cost of rural expansion '48 estimated at $1,923,000.

* * *

More than half of $1,018,235,000 new securities which became fully effective under Securities Act during month of Sept. had been registered with FCC by four telephone companies, Commission disclosed Oct. 29. Four telephone concerns were: A. T. &. T. Co., New England T. & T. Co., General Tel. Corp. and Carolina T. & T. Co.

* * *

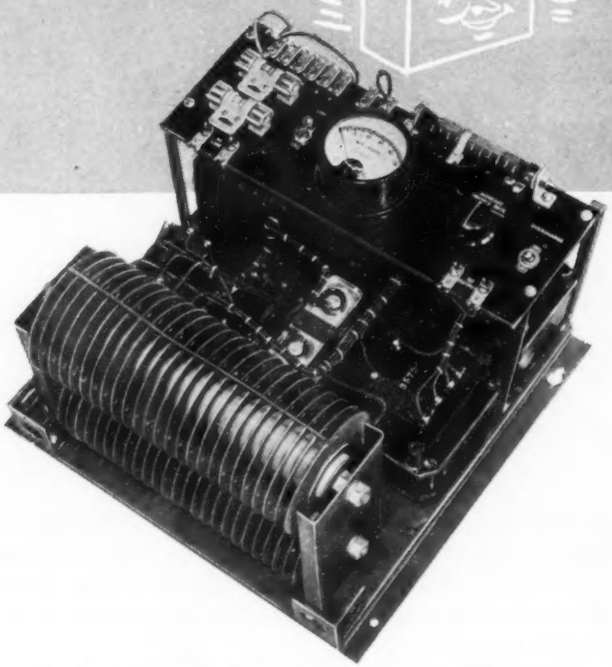
Highlights: Lima (Ohio) T. & T. Co. announced $60,000 modernization progam; automatic service scheduled for Dunkirk, Elida, Lafayette, Westminster, Waynesfield....Associated Tel. Co., Ltd., Santa Monica, Calif., to issue $6 million bonds, 150,000 preferred....Chatham (N. Y.) Tel. Corp., and Columbia-Rensselaer (N. Y.) T. & T. Co. planning consolidation....Public Utilities Calif. Corp. to establish exchanges at Lake City and Eagleville, Calif.; plans conversion of Fort Bidwell and Cedarville, Calif., exchanges to automatic service.

Ray Smith

Ray W. Smith, Editor

2 WAYS TO TREAT BATTERIES...

1. KEEP THEM IN TOP CONDITION



In main exchanges where batteries are a must, it pays to keep them in top condition, fully charged. The Raytheon RECTICHARGER accomplishes this while carrying the normal current demand, and offers these plus advantages:

DC STABILIZER, magnetic, non-wearing, automatically provides constant voltage output regardless of variations in load.

AC STABILIZER, also magnetic type, makes unit independent of AC line fluctuations from 95 to 130 volts.

DRY DISK RECTIFYING UNITS for long life, no expendable parts.

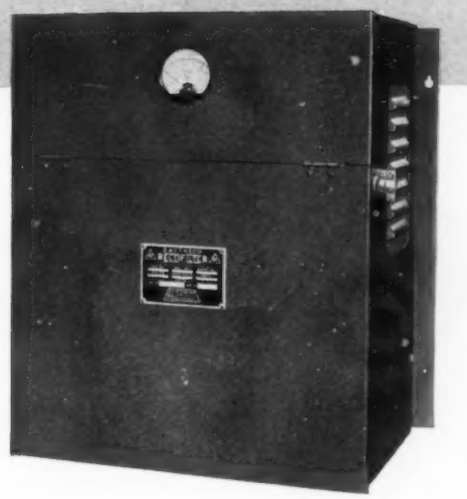
CORRECT TRICKLE RATE, output adjustable to meet battery manufacturer's recommendations.

OVERCHARGE SWITCH permits application of equalizing, soaking or freshening charge to battery.

INTERIOR PARTS ACCESSIBLE—cover readily lifted by removing screws.

Write for Bulletin DL-RCR-506

2. GET RID OF THEM



For supplying DC power to PBX and PAX boards, large independent telephone companies are replacing worn batteries with Raytheon RECTIFILTERS. Over 12 years (since 1934) experience has taught them that the Raytheon Rectifilters:

OUTLAST BATTERIES many times.

ELIMINATE TROUBLE and expense of routine service for battery inspection.

RELEASE WIRE carrying charging current from the central office to subscribers' PBX boards for revenue producing service.

MINIMIZE POWER COST because of high efficiency in converting AC to DC.

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As originators of automatic telephones and switching equipment, Automatic Electric Company has earned world-wide prestige, and acceptance of its products by telephone men everywhere. Over 70 countries have standardized on Strowger Automatic equipment, pioneered by Automatic Electric and now offered through the facilities of the International AUTOMATIC ELECTRIC Group.

This position has been earned through half a century of leadership. Thanks to this experience, users of Automatic Electric equipment are assured of the highest quality, and the finest standards of operating performance.

Automatic Electric equipment is now providing dependable telephone service in all parts of the world. Wherever you are, whatever your requirements may be, it is available also to you, through the world-wide facilities of the International AUTOMATIC ELECTRIC Group.

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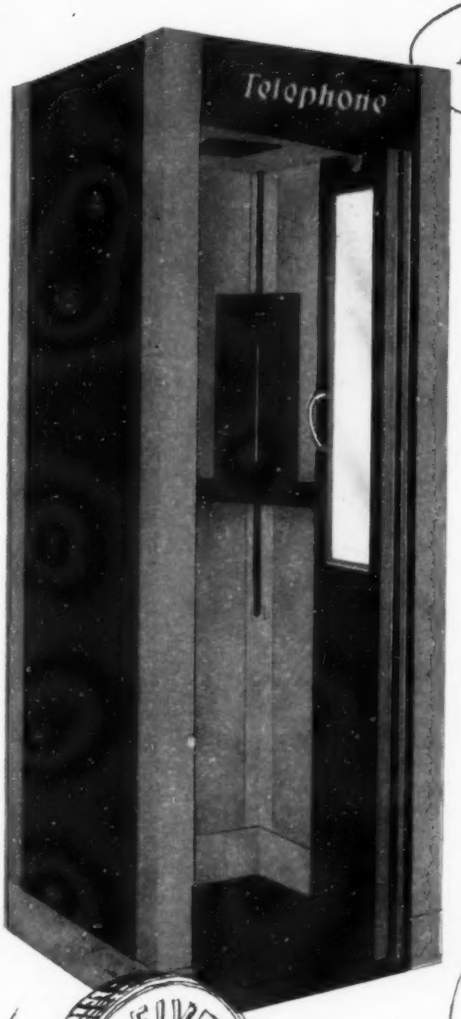

Watch The **NICKELS** *Roll In!*

If ever a telephone booth was styled to bring in a steady stream of nickels, the Sherron Stainless Steel Telephone Booth is it. The sparkling stainless steel surfaces never grow dull or dingy. Ever bright, ever invitingly new, its enduring beauty is sure to pay off in stepped up pay station profits.

MORE REASONS WHY THE SHERRON ACOUSTICS STEEL TELEPHONE BOOTH IS TOPS:

- *All-metal rigid construction*
- *Improved door hinges prevent creaking or sticking. Door operates easily and quietly in stainless steel track*
- *Automatic, noiseless door switch controls ceiling light of special design, eliminating current consumption when not in use*
- *Linoleum covered steel floor prevents wear on floor of owner's premises*
- *Adjustable shelf and instrument backboard*
- *Electric ventilating unit of improved type*
- *Steel seat of new design*
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SHERRON METALLIC CORPORATION

1201 FLUSHING AVENUE • BROOKLYN 6 • NEW YORK

This experiment will show you how to eliminate a major cause of breaks in telephone and telegraph lines.

BEND A PIECE of ordinary steel telephone conductor wire until it breaks. Count the number of bends—it won't be many.

Now take a piece of high strength U·S·S Amertel 135. Reinforce it with two or three strands of stiff wire wound around the conductor. Try to bend it. You'll find that the extra strength makes the assembly extremely difficult to bend.

That, in effect, is how PFT Armor Rods protect telephone and telegraph lines from the destructive action of vibration. The armor rods dampen vibration so effectively that breaks from this source are practically eliminated.

Improved methods of tying further reduce chafing and wear.

The combination of new high strength U·S·S Amertel 135, PFT Armor Rods and better ties has resulted in long-span lines that are not only lower in first cost but lower in maintenance cost, too. Write for our booklets giving complete information.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
Columbia Steel Company, San Francisco
Pacific Coast Distributors
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
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UNITED STATES STEEL

Look for this tag
It is your assurance of high quality wire.

AMERICAN STEEL & WIRE COMPANY
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BETTER PLAN

FOR

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If you want us to help -- That will give us TIME --

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Always -- at your service!

GUSTAV HIRSCH ORGANIZATION Inc.

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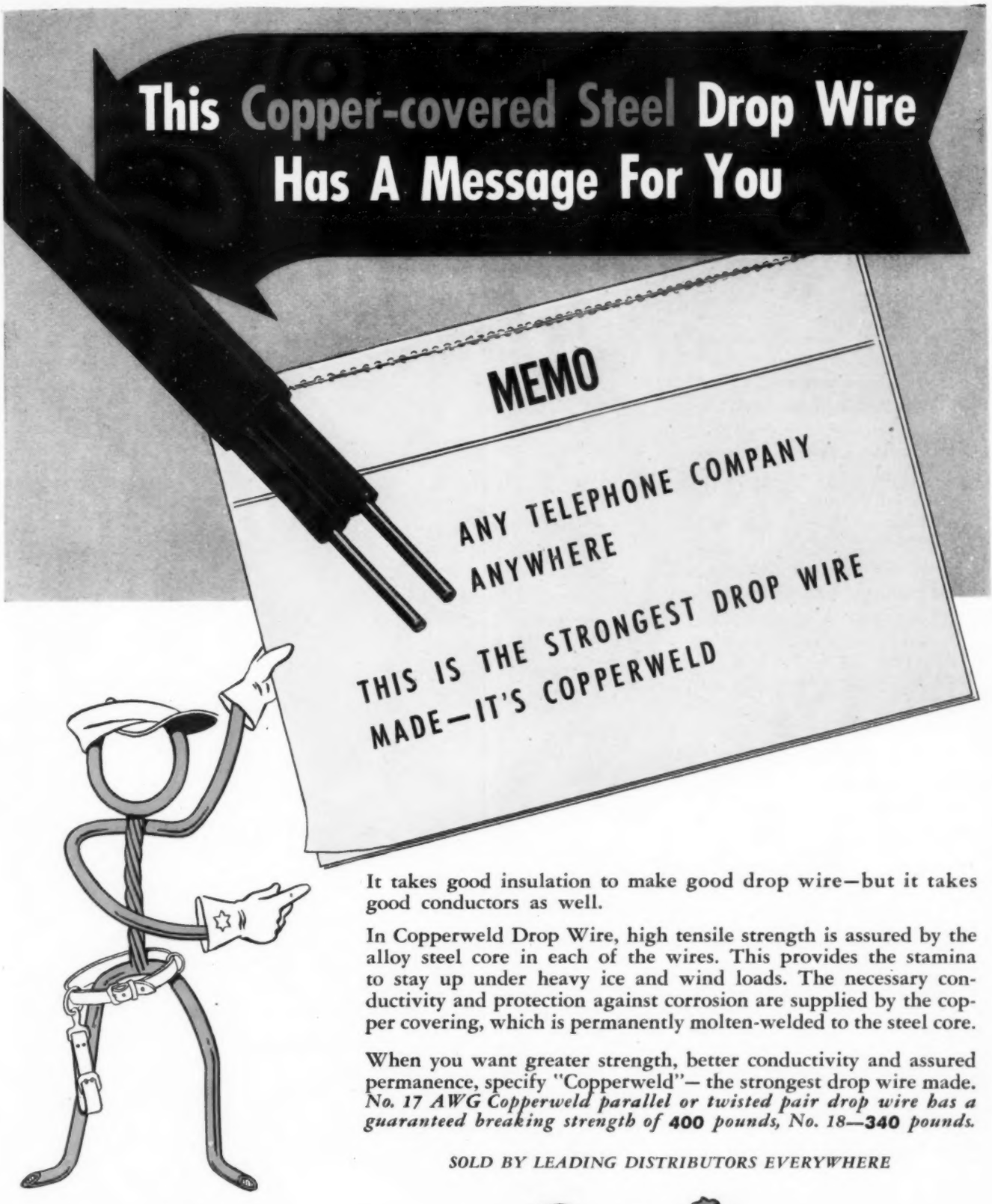
Nationally & Internationally known for our Know How!

This Copper-covered Steel Drop Wire Has A Message For You



It takes good insulation to make good drop wire—but it takes good conductors as well.

In Copperweld Drop Wire, high tensile strength is assured by the alloy steel core in each of the wires. This provides the stamina to stay up under heavy ice and wind loads. The necessary conductivity and protection against corrosion are supplied by the copper covering, which is permanently molten-welded to the steel core.

When you want greater strength, better conductivity and assured permanence, specify "Copperweld"— the strongest drop wire made. *No. 17 AWG Copperweld parallel or twisted pair drop wire has a guaranteed breaking strength of* **400** *pounds, No. 18—***340** *pounds.*

SOLD BY LEADING DISTRIBUTORS EVERYWHERE

Copperweld Telephone Products

COPPERWELD STEEL COMPANY, *Glassport, Pa.*

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LABORATORY REPORT ...on GENCATEL

DROP WIRE

Laboratory tests show that age has no apparent effect on Gencatel drop wire. They show, too, that Gencatel is unaffected by bending and flexing even at temperatures down to 90 degrees below zero. Gencatel shows excellent abrasion resistance and is unaffected by ultraviolet irradiation over exposures as long as 4,000 hours. These tests show, further, that Gencatel has a high immunity to effects of precipitation and temperature extremes.

But the best test of Gencatel for you is to try it in actual service. Order 5,000 feet today—and test it yourself. Please specify whether you want parallel or twisted pair.

Gencatel Drop Wire is made by General Cable Corporation, and is

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They're Available Again—From Stock!

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TYPE "P" DROP WIRE CLAMPS

Due to increased production facilities, Type "P" Drop Wire Clamps are once again available from stock. Their wedge grip provides a clean, economical and proven method of supporting drop wire. They grip twisted or parallel drop wire tightly and permit free swinging at the tie . . . thus placing all wear on the hardware and greatly reducing insulation damage. Suitable for use on all standard types of drop wire. *Over 50,000,000 Reliable "P" Clamps can't be wrong!*

Reliable

ELECTRIC COMPANY

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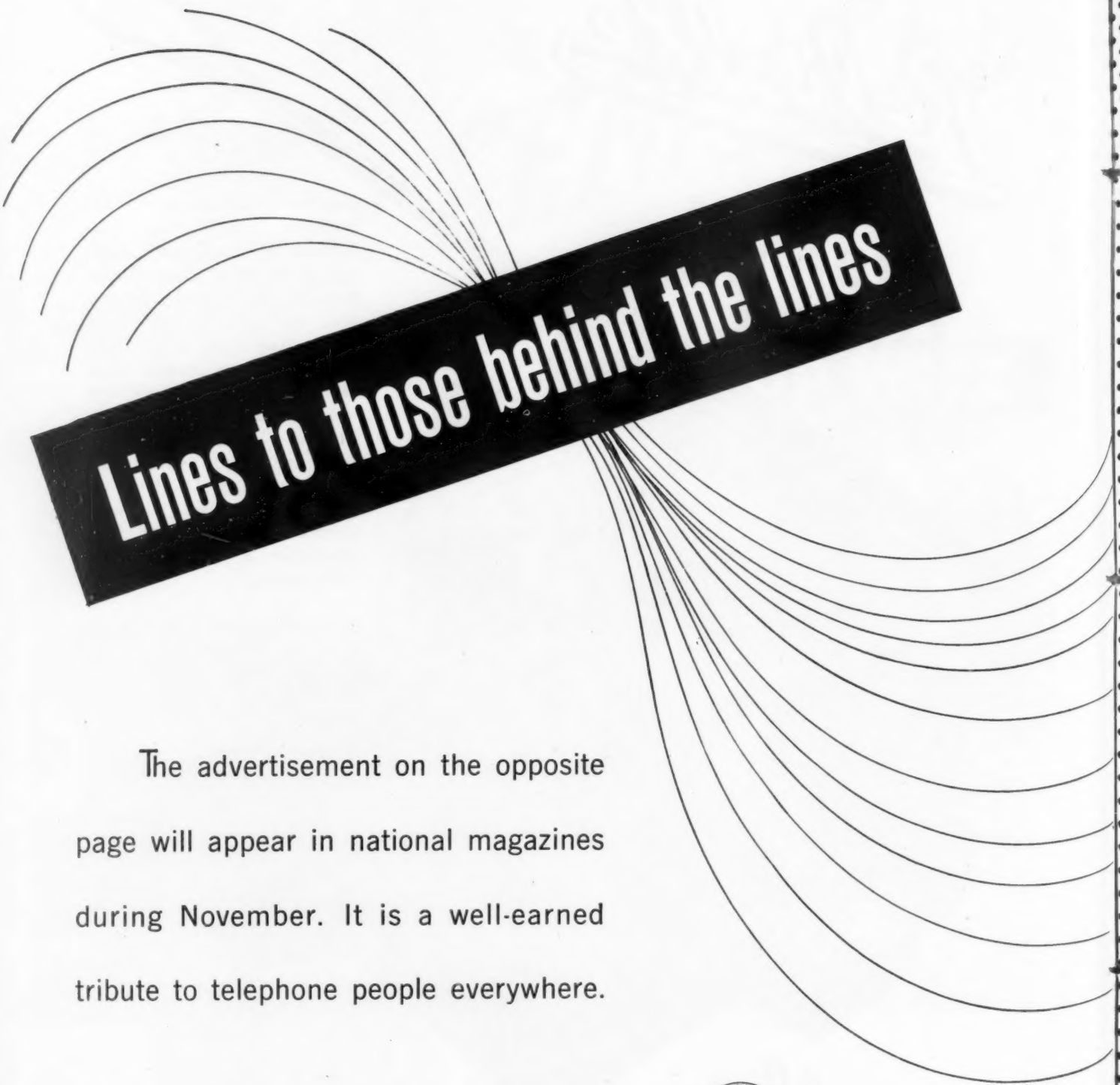
OVER 40 YEARS *Service* TO THE TELEPHONE INDUSTRY



The advertisement on the opposite page will appear in national magazines during November. It is a well-earned tribute to telephone people everywhere.

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

"Weavers of Speech"

To you, who each day
Take on anew your tasks
Along the lines that speech will go
Through city streets or far out
Upon some mountainside
Where you have blazed a trail
And kept it clear;
To you there comes from all who use the wires
A tribute for a job well done.

For these are not just still and idle strands
That stretch across a country vast and wide
But bearers
Of life's friendly words
And messages of high import
To people everywhere.

Not spectacular, your usual day,
Nor in the headlines
Except they be of fire, or storm, or flood.
Then a grateful nation
Knows the full measure of your skill and worth.
And the fine spirit of service
Which puts truth and purpose
In this honored creed—
"The message must go through."

BELL TELEPHONE SYSTEM

EDITORIAL

An Ounce Of Prevention

THE truth of the saying that an ounce of prevention is worth a pound of cure has never been better exemplified than by the present situation in the telephone business.

The fact is that now, with the costs of repair work the highest ever, an ounce of prevention is probably worth several pounds of cure.

Every telephone manager knows what is happening to his maintenance costs. Even the most trivial job of ordinary maintenance has become unduly expensive. New high levels of wages and of the costs of maintenance materials have made the avoidance of repair work more important than ever before.

Even the relatively inexpensive job of going out and splicing a broken wire on a company-owned farm line has now become an expensive undertaking. And if a repair job must be dealt with on an emergency basis, which means that it must be done as quickly as possible and regardless of cost, it can become a serious proposition from the standpoint of the company's earnings statement.

A cure for at least some, and in most cases many, of present-day high cost maintenance jobs, is that thing called "preventive maintenance". Roughly speaking, this is the proposition of fixing a thing, before it breaks, so that it won't break—or at least so that it will not be nearly as likely to break.

Preventive maintenance is, in most cases, the cheapest possible type of maintenance. It has another great virtue; it prevents service interruptions that result from break-downs in plant or equipment. Another advantage is that preventive maintenance can be done in an orderly manner, when labor is best available and weather most suitable for the job.

Telephone managements with foresight are going "all out" for preventive maintenance this year. The severe winter experienced in many parts of the country last year taught them that it is cheaper and better to fix the break before it happens and while the work can be done in an orderly manner and under pleasant weather conditions, than to foot the bill for having to do the work in the dead of winter, with the temperature probably near zero, roads covered with ice, and the wind blowing a gale.

Telephone companies must do their best to overcome rapidly rising costs and expenses by every practicable device. Preventive maintenance is a highly practicable device for lowering maintenance costs.

High operating and maintenance costs are a test of management. They necessitate all the ingenuity and foresight possible. It would be difficult to find any element in business as valuable, under these conditions, as an ounce of prevention.

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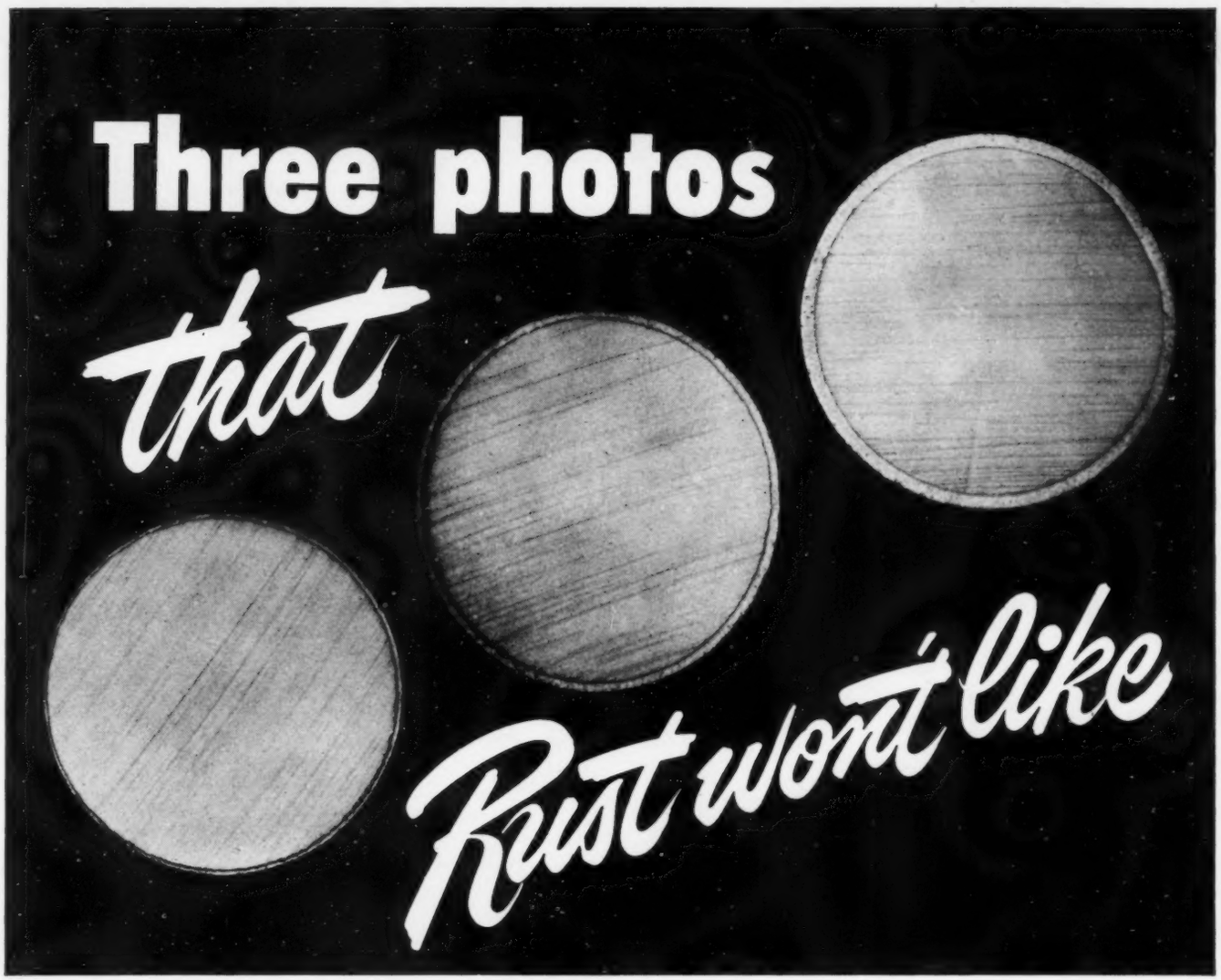


Cut a piece of bethanized strand and the enlarged cross-section tells you an interesting story. To illustrate it, we show here unetched sections of three bethanized* zinc-jacketed wires—one with an A coating, one with B coating, one with C.

Photos of the three magnifications have not been "glorified" in any way. Even so, you can't help noting the uniform coating-thickness that each picture shows. No thick spots here and thin ones there. *Uniform* protection around the entire circumference of each wire. This is something you can depend upon in bethanized strand.

That's something rust doesn't like. Rust would much rather see irregularities—particularly thin spots that offer only feeble resistance to attack.

Uniform coating is but one of the many advantages of bethanized strand. Another is the high ductility of this coating—a feature that enables the zinc armor to resist cracking and flaking even under severe, repeated bending. Why not let us explain the story of bethanized strand in person?

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

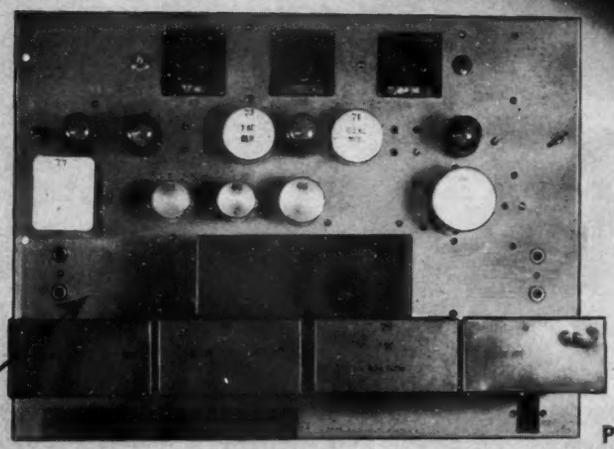
Export Distributor: Bethlehem Steel Export Corporation

**"Bethanizing" is a trade name for our exclusive process of zinc-coating wires electrolytically. Bethlehem's A coating is equivalent to extra-galvanized; B is twice weight of A; C three times weight of A.*

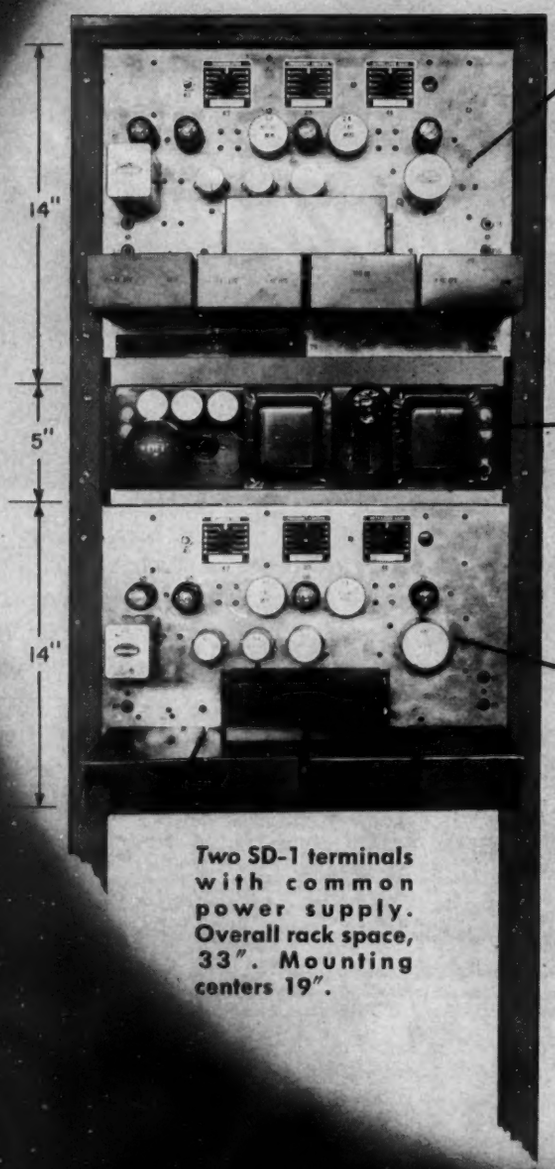
BETHANIZED STRAND

BETHLEHEM STEEL

Now! A New Adler S

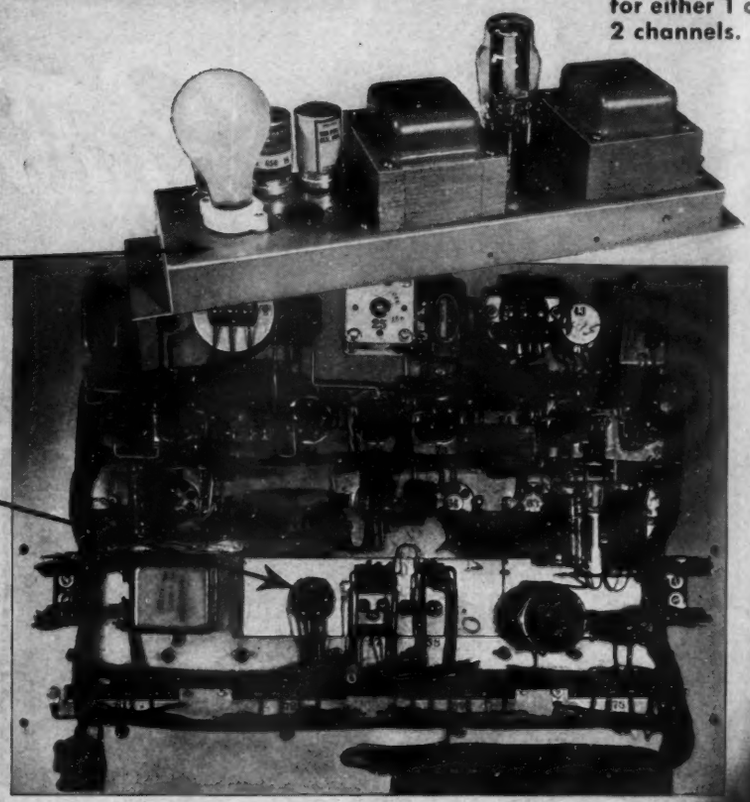


Front view of SD-1 short haul carrier terminal.



Two SD-1 terminals with common power supply. Overall rack space, 33". Mounting centers 19".

Power supply for either 1 or 2 channels.



SD-1 short haul carrier terminal, rear view.

STROMBERG-CARLSON

Factory, General Offices: Rochester 3, N. Y.
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TELEPHONES, SWITCHBOARDS • SOUND EQUIPMENT INDU

...er SHORT HAUL *Carrier*

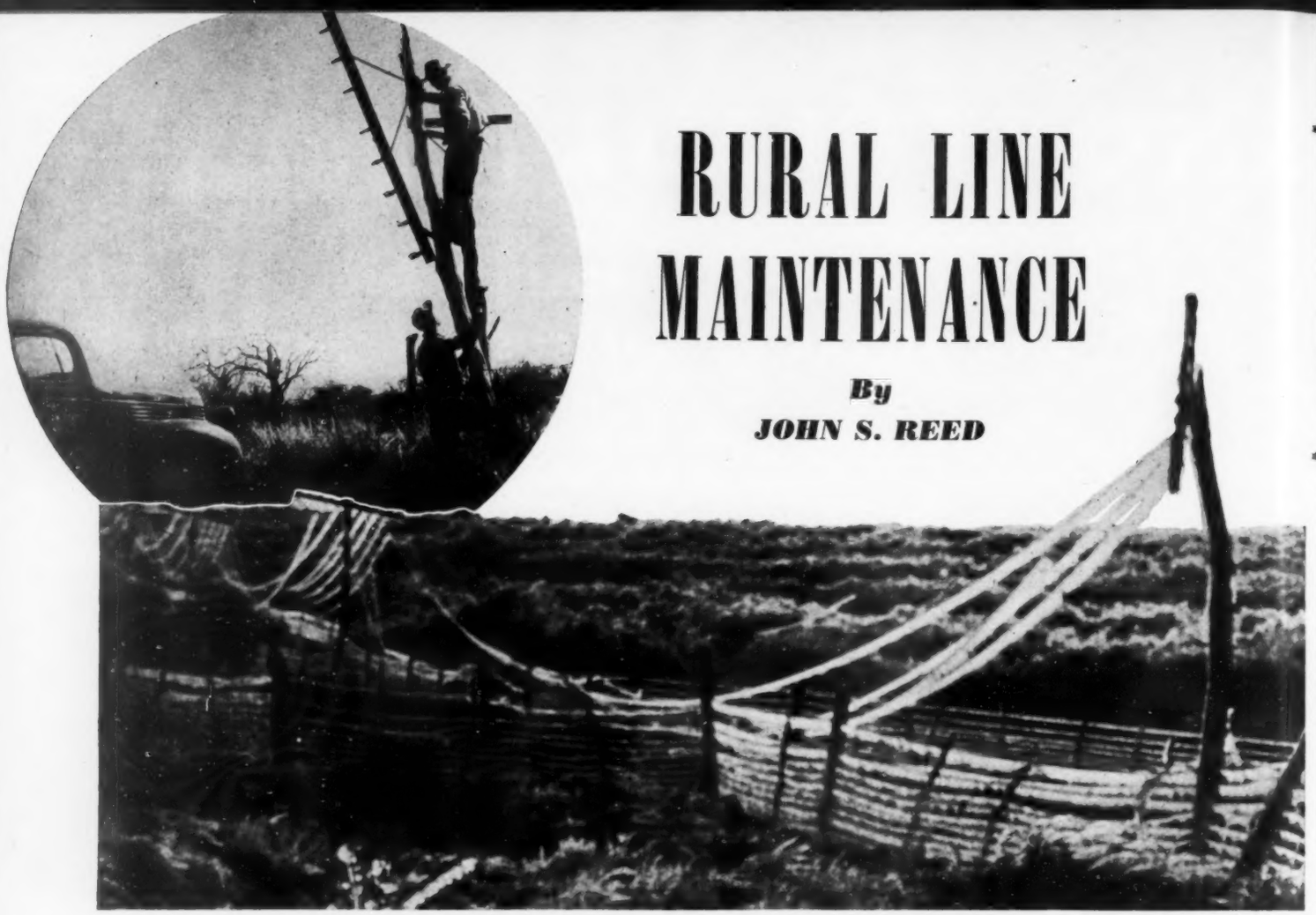
WITH AMAZING EFFICIENCY AND FLEXIBILITY AND AT THE *LOWEST COST ON THE MARKET!*

Good news indeed for independent operating companies sorely needing *short haul* carrier equipment. Installation is rapid and simple. Discuss your requirements with your Stromberg-Carlson representative and you'll be amazed for how little cost you can increase toll or trunk line facilities the modern Adler way.

CHECK THESE 15 POINTS OF ADLER SUPERIORITY:

- **1.** A single or two channel system. Second channel may be added on same wire circuits to meet traffic demands.
- **2.** Terminals are wired for both ring-down, pulse-dialing and supervision operation. Conversion to dialing and supervision can be made to terminals initially provided for ring-down operation.
- **3.** Complete A.C. operation from commercial 115V. 60 cycle supply.
- **4.** Unit construction. Complete terminal occupies 14" of standard relay rack space. Power unit occupies 5" of relay rack space.
- **5.** One power unit has sufficient capacity to supply two carrier terminals. When the second channel is added, *no additional power units* need be purchased.
- **6.** All signalling is accomplished within the limits of standard carrier frequency bands, *thus permitting the addition of future carrier channels.*
- **7.** Trouble-free copper-oxide modulators and demodulators provide for a minimum of distortion and maintenance-free operation over a long period of time.
- **8.** Designed for ease of accessibility to components during maintenance or test.
- **9.** Provides a 0 db net loss circuit over a line having an attenuation of 15 db at the top carrier frequency.
- **10.** Repeaters are available to extend the range of the short haul carrier.
- **11.** A complete line of auxiliary equipment available.
- **12.** Installation reduced to a few simple steps.
- **13.** Power consumption 38 watts per terminal.
- **14.** Average commercial power cost per carrier channel *less than* 25 cents per day.
- **15.** Backed by over 20 years of successful carrier systems experience.

Adler Short Haul Carriers are distributed exclusively by Stromberg-Carlson to the independent telephone field.



RURAL LINE MAINTENANCE

By
JOHN S. REED

NOW IS THE time to give special attention to rural line maintenance. This article outlines a program to correct defects before they result in complaints from subscribers.

WHEN RURAL lines have been in service a number of years, it is time to give special attention to their maintenance. By then, poles will begin to fail under storm stresses as the result of wood decay or termite damage. Crossarms and insulator pins also deteriorate during this time, the line wires tend to sag badly and become rusty, insulators are broken, and tie wires become loosened.

In addition to the gradual deterioration of the pole and wire plant, rural open-wire lines are subject to service interruptions resulting from storms, accidental contacts with power lines at crossings, or breakage of poles in vehicular traffic accidents. A common and annoying form of service interruption occurs when pieces of bailing wire or similar material are thrown onto the lines by careless or irresponsible persons, or weeds or tree branches are blown thereon.

It is the purpose of this article to outline a preventive maintenance program to correct such defects before they become serious enough to result in complaints from the subscribers.

Outline of the Maintenance Program

TELEPHONE companies differ to some extent in their methods of handling the maintenance of their rural lines. Generally, however, the larger companies, especially when extensive deterioration of the lines is involved make use of full-time inspectors, who go over the route of the open-wire lines. The inspectors jot down unsatisfactory conditions observed, together with instructions for correcting these conditions. Later, a construction crew receives detailed instructions based on the inspector's reports, and proceeds with the necessary repairs.

A more common procedure suitable for small exchanges is to have one or two maintenance men drive along the route of each wire lead about once each year and inspect the line for faults. These men are provided with the necessary tools and materials for making most of the repairs on the spot.

Rural Line Inspection Procedure

USUALLY, THE inspection of the rural lines can be made from the car as it is driven along the road paralleling the lines. At certain important points in the line, however, it is desirable to climb a pole for a closer check, as at junctions of cable with open wire, junctions of farm lines with the main line, corners where buck arm construction is utilized, and railroad or river crossings.

In making the inspection, allowance should be made for the use of obsolete materials and for variations in standard construction practices, as long as no hazards are created or no line trouble will result. If foreign attachments are found,

Fig. 1—Offsetting the pole line and using a sidearm assures permanent clearance from dense plant growths.

they should be checked to make sure they have been authorized and that they are properly installed.

Checking Wire Clearances

SINCE THE telephone company will be held liable for improper wire clearances, as the result of highway accidents due to low wires, all clearances at highway and railroad crossings, farm driveway entrances, and along the road should be checked to make sure that they conform to the standard minimum requirements. Improper clearances from power lines are an important source of dangerous contacts with telephone circuits. It should be remembered that, even if there appears to be no danger of actual physical contact between a high voltage circuit and a telephone line, a power follow-up arc can result from a lightning surge passing between the two circuits. These circuits must have sufficient separation, so that no arc can be sustained in case of a momentary breakdown.

Telephone lines should have a certain amount of clearance from trees and shrubs. This clearance should last for the period of a tree trimming cycle, ordinarily two years. Dead or weak branches that may fall on the line wires should not be tolerated.

Since tree pruning is an expensive procedure, it is possible to obtain adequate clearance from dense plant growths by offsetting the wire or using a sidearm construction. Both methods are illustrated in Figure No. 1. A pole in a light bracket lead may be raked to provide the desired clearance, if this method does not result in an excessive pole lean. Placing sufficiently tall poles to clear the plant growths is sometimes the only possible remedy in extreme cases.

Checking Condition Of Poles

A GOOD METHOD of checking the condition of poles in a light rural lead is to apply a side stress on each pole with a pike pole. The pike is applied to the center of the wire load at an angle of about 45 degrees to the ground. For poles carrying two to six wires, one man is sufficient to apply the required stress, while two men are needed in the case of poles carrying eight to ten wires. The pole should not be rocked, but rather a steady push should be applied. If the pole does not break or crack, it may be considered sufficiently strong to last until the next inspection, if it meets other requirements. This test should not be made, if the ground is too soft to hold the pole against the side-stress applied.

The pike pole test is not practicable for guyed poles or poles carrying more than ten wires. In this case, each pole should be examined for the following defects:

(1) Too short for adequate clearance from the ground.
(2) Lightning or storm damage that weakens the pole.
(3) Woodpecker holes resulting in the loss of one-quarter or more of the pole cross-section.
(4) Split or broken top weakening the pole (Figure No. 2).
(5) Hollow heart or decay pockets, as indicated by sounding the pole with a hammer.

Fig. 2—Poles with split or broken top need replacement.

The test for hollow heart or decay pockets is made by rapping the pole sharply with a hammer from the ground to as high up as possible while standing on the ground. A good, sound pole will sound clear and solid, but if decayed spots or hollow places are present, the wood over the affected places will sound dull or hollow. In this connection, it should be remembered that shakes or large checks in the pole or a wet surface or interior may result in sounds resembling that given when a decayed or hollow place is struck.

After a defective pole is removed, it should be examined to determine if it can be salvaged. A pole with hollow heart, resulting in a shell of good, sound wood less than two and one-half inches thick should not be reused. It is obvious that a pole with its butt honeycombed throughout by termites or ants should not be salvaged.

The foregoing inspection of poles need be made only after the poles have been in service ten to fifteen years, depending on the pole treatment, and thereafter once every four or five years.

Other Pole Inspection Requirements

IN DRIVING over the route of the pole lead, each pole should be observed to make sure they are properly supporting the line wires.

In general, poles carrying not more than six wires should not lean more than one foot for every ten feet of pole length. Those carrying more than six wires should not lean more than one foot for every fifteen feet of pole length. Permissible exceptions are when a pole is purposely raked out of line to provide clearance from plant growths, in case other methods are not practicable. Excessive lean, however, is undesirable under most circumstances.

Poles that tend to lean considerably in a straight section of the line require ground bracing to hold them upright. This condition is likely to occur when the soil is soft and there is a strong prevalent crosswind.

Corner poles that have more than three feet lean at the top should be straightened. Such a condition may be due to a slack guy or an anchor of inadequate strength, as illustrated in Figure No. 3. Straightening the

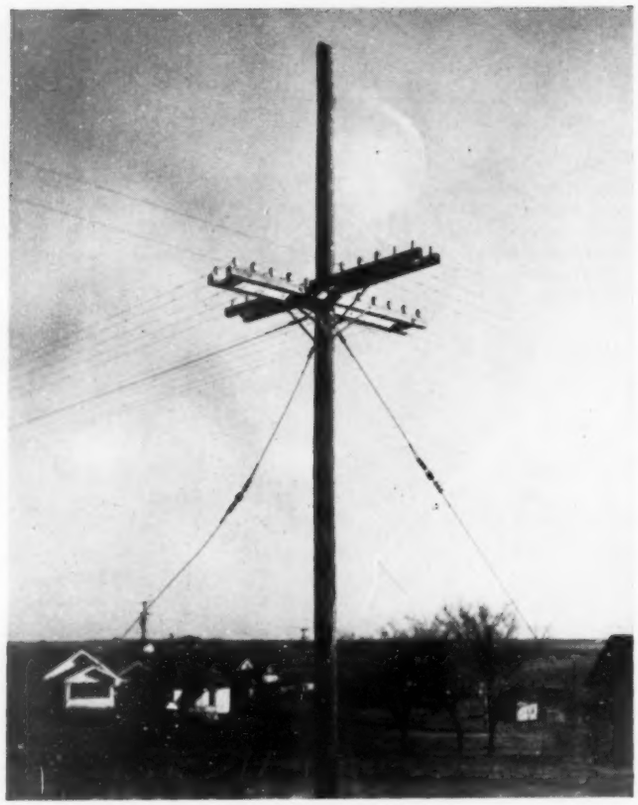


Fig. 3 — The slack guy on this pole will cause a leaning pole in time.

corner pole may require splicing in short lengths of wire to prevent excessive stress in the line wires.

If low wires are encountered, this condition may be due to the line wires having stretched; a guy failing to hold a dead-end or corner pole; or a pole relocated to another point in the line, resulting in an excessively long span. A new farm driveway may be established, requiring that the wires at the entrance to the driveway be raised to the proper height to clear the driveway.

When the poles have more than one crossarm, the arms may be "short spaced" for more clearance, when necessary. The reduced spacing between crossarms should never be less than twelve inches.

Crossarms, Insulator Pins, And Brackets

IF THE CROSSARMS are found to be split or decayed to the point where the insulator pins pull out of, or settle on the crossarm, they should be replaced. Sound crossarms split at the ends may be reinforced by passing a bolt through each split end. Split ends on crossarms at a corner pole should not be neglected as the wires may come together on the outside end of the arm, or the last insulator at the inside end may pull out and fall to the ground with the wire.

Insulator pins or brackets that cannot hold the insulator need to be replaced. If a bracket is found to be loose, but is in good condition, it may be placed a little to one side or the other of its original location for a more secure mounting. Loose brackets at a dead-end pole may be reinforced with bracket clips, as illustrated in Figure No. 4.

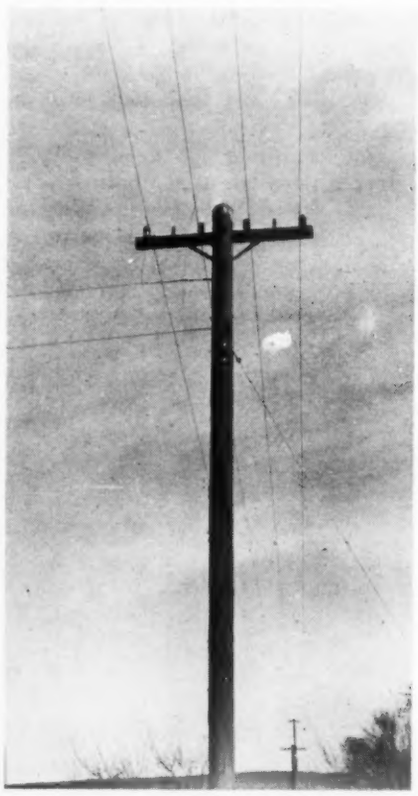


Fig. 4—Bracket clips look better and hold better than wire bridling.

Line Wires, Tie Wires, And Insulators

LINE WIRES should not be badly pitted by corrosion and should show no nicks or kinks. Wire that is taken down for any reason may be salvaged, if the galvanizing is still intact as shown by a smooth, black appearance.

The wires should be properly placed so that they will pull against their insulators.

Hand-made connections are not desirable and should be cut out. Twisted sleeves that have gone bad should also be cut out. Compression or rolled sleeves have proved their superiority over all types of line connections formerly used and should be employed in all splicing work.

Sleeves that are suspected to be defective can be checked with an ohmmeter. A fluctuating or high reading always indicates a bad splice, provided that the connection of the meter on each side of the splice is well made.

All broken or missing insulators should be replaced. If a "floating" insulator is found, the insulator pin or bracket may have worn or stripped threads and should be replaced.

Loose insulator ties will cause the line wire to chafe on the insulator, creating a condition that is known as a tie-wire "burn." Loose ties should be remade, using a new tie wire in each case. When much trouble is experienced with tie-wire burns, tie wire splints or reinforcing wire may be utilized to dampen wire vibrations at the insulators. They will be found especially effective on long wire spans.

Debris Accumulation on Line Wires

LINE WIRES tend to accumulate debris as the result of weeds or tree branches being blown onto them. Sometimes pieces of baling wire are thrown onto the wires.

Debris can be shaken off the wires, the latter being untied, if necessary, to obtain more vigorous action. Alternatively, the wire may be held down with one hand and then struck with the other hand to make the hanging object jump off. If either method will not work, a handline may be thrown over the wires and pulled along from the ground to pick up the clinging debris and

(*Please turn to page* 61)

TELEPHONE Building Addition

Features All-Weld Steel Construction

By THOS. A. OSBORNE
General Plant Supt.
Associated Telephone Co., Ltd.

ASSOCIATED Telephone Company, Ltd., Santa Monica, California, is now engaged in a project which will add two floors to its Long Beach Main central office building located at 550 Elm Avenue, Long Beach, California, to provide 29,350 square feet of additional floor space. This addition will house the General Revenue Accounting Department, the Long Beach Traffic Department, and the South Coast District Engineering and Equipment Departments. Three of these departments are now located on the second floor and must be moved to make room for additional central office equipment. Served by the Long Beach exchange at present are 79,513 stations and as of August 31, 1947, some 6,260 unfilled applications for primary services were being held. The Long Beach exchange now has a population of more than 355,500 and is growing in leaps and bounds. In addition to the Main central office there are four other central offices, namely, Termino, North, Market and Lakewood.

In September 1931, the Main central office in the Long Beach exchange was moved from Fifth Street to its present location at 550 Elm Avenue. At the time of this move Long Beach had a population of 142,032 and the company was serving 29,545 stations. The new building to which the central office was moved consisted of two floors above grade and a basement, containing in all 49,536 square feet of useable space. The frame work for the original two floors was of steel structural design, as shown in Figure 1. This structure withstood the 1933 earthquake with little, if any, damage to the steel frame. The disaster of 1933, however, made everyone conscious of the necessity of building earthquake resisting structures in the future. The governing bodies having jurisdiction over building construction in the State of California enacted laws requiring earthquake resistant construction in all types of buildings

Thos. A. Osborne

except one story residences. Inasmuch as the Long Beach Main central office was constructed before the enactment of these laws, it was necessary to introduce resisting elements, and to design and integrate the new addition with the existing structure to enable it to resist seismic forces, all as prescribed by the local building code.

All-Weld Steel Construction

IN 1946, WHEN it was decided that the most economical method of providing additional space was to add to the present building, Mr. Maurice Sasso was commissioned as the architect to design the addition and the all weld steel construction, shown in Figure 2, was the result. Mr. Sasso devoted many months of work to the idea of welded structures before the beginning of World War II but due to the shortage of experienced welders he had not heretofore been in a position to recommend this type to any builder or owner. However, thousands of experienced welders were developed during the recent conflict and the services of the best of these were available to the steel erection companies. It was the availability of these welders and the progress made in the art of welding that prompted the building of the continuous steel frame shown in Figure 2.

The forces of nature are best resisted by a system of framing with rigid joints capable of resisting stresses due to both vertical and horizontal forces. Steel frames constructed with riveted joints in which girder to column and beam to girder connections are made with angle clips riveted into the web of adjoining members are not strictly rigid. Seat angles and top frame angle connections when used offer a very small amount of rigidity in the frame as a whole and diagonal bracing of vertical members in some form or another is resorted to. Diagonal bracing and triangular members are not desirable where the structure is subjected to earthquake shock, since diagonal bracing or triangular shaped members cannot change position without deforming or being subjected to severe stresses.

True continuity and rigidity in steel frames can be attained by welding which has been demonstrated in modern construction of water crafts (boats), aircraft, land craft (automobiles, railroad and other mobile units) and innumerable other applications.

An all welded continuous frame system was adopted in the two story addition to the Long Beach main office building, first, because of its greater resistance to static and dynamic forces, and, second, because it eliminated the noise of riveting which would have been a great disturbing factor to the employees and to the public as well. In general, the continuity of this steel frame is attained in the following manner:

(1) The columns are each made up of four angle sections spread apart to allow the girders and beams to pass through and are integrated by welding.

(2) The girders and spandrels are one, two and three spans long and pass through the columns uninterrupted by the ends of adjoining spans

which are connected and made continuous by butt welding the flanges at the center of the common supporting column.

(3) The floor beams are made continuous across the girder by butt welding their top flanges, and butt welding the bottom flange to the web of the supporting girder. (See Figure No. 3)

(4) The rigidity of girder and/or beam to column connection is attained by fixing the top and bottom flange of the horizontal member to the exterior faces of the column by means of suitable members which will develop the required fixity.

Because the component members of the columns are spread apart, the radius of gyrations of this type of column is much greater than that of an H section of equivalent area and thus is capable of resisting a greater bending moment and a greater vertical load. The feature of spreading the component parts of the column permits the horizontal members framing it to pass through uninterruptedly, thus allowing the girder and spandrel to be of any length and to bridge any number of spans. The length of the girder is only limited by the practicability of handling for the individual job.

Failure-Proof Construction

IT IS THE opinion of construction experts who have seen this particular job that the connection of girder to column is failure proof for the following reasons:

(1) The girder is nested between the column members.

(2) The girder is continuous through the column, there being no joint to fail.

(3) At columns where one girder splices into the adjacent girder the end of the girder projects into the column for a minimum of seven inches, thus failure of the welding may reduce the continuity but will not cause the loss of support. Finally, if the welding of the brackets supporting the girder fails then the girder will rest on the concrete core of the column which can carry the reaction with ample safety.

The floor beams are of single span length and made continuous across the supporting girder in the following manner:

The length of the beam is made equal to the theoretical span less the width of the butt weld required. At each end the web of the beam is coped at the root of the top flange a depth of two inches and a length equal to one-half the width of the supporting girder flange thus forming a notch at both ends. When these beams are swung into position the flange of all beams overlays the flange of the girder approximately one half the width of the girder flange, then a filler plate is inserted between the flange of the supporting girder and that of the beam, one on each side of the beam web, after which the top flange of the beam is butt welded.

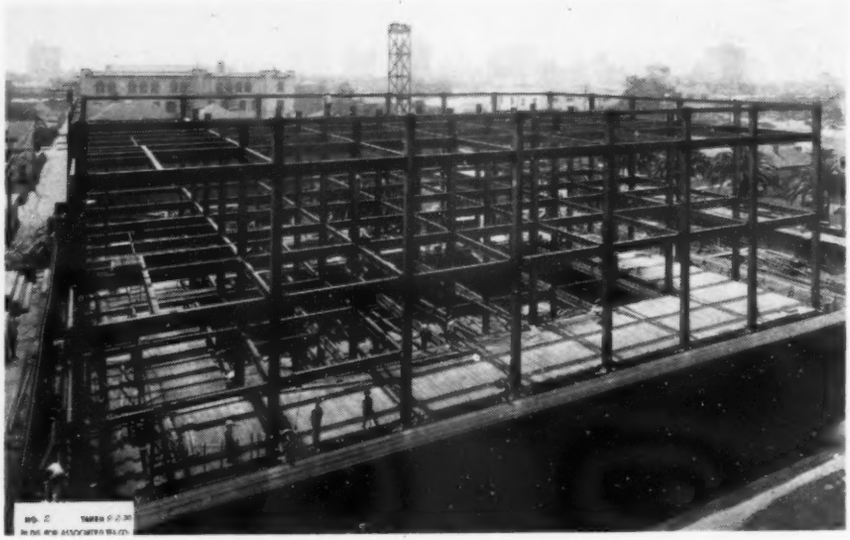


Fig. 1—The framework for the original two floors was of steel structural design.

The lower flange of the beam is supported on and welded to the shelf bracket attached to the girder web. This bracket carries the end reaction of the beam and furnishes the backing for butt welding of beam bottom flange to girder web.

Overlaying the flange of the beam on that of the girder has the following purposes:

(1) To eliminate erection clips.

(2) To permit butt welding of beam flanges.

The filler plates serve:—(1) To space the flanges so as to eliminate grinding and planing the cut portion of the web at the root of the upper flange; (2) to obtain even bearing of beam flange over girder flange; (3) to increase the resistance of the beam at its supports, and (4) to form the backing for butt welding of flanges.

The floor beams are all of the same depth. When the end moment due to loading is greater than the resisting moment of the beam, the cross section of the beam is increased by the addition of plates as explained for girders.

The making up or assembly of this type of frame has aroused the enthusiasm of the erectors on the job who have pronounced it the most practical and easiest frame they have ever assembled. Quoting their opinion and experience, they have stated that all parts were very easy to erect, the frame went together without a single misfit and this type of frame can be assembled in final position in from 50 to 60 per cent of the time required to assemble a similar riveted frame.

It is easy to visualize the fact that one multi-span girder replaces three single spans, that this long member merely rests on the intermediate supporting columns and that one bolt at each end is all that is required for temporary connection, whereas each single girder would require a much longer time to bring it into position with the column connection and insert the temporary bolts. The time required to pick up, lift and set the multi-span girder on its supports and insert one bolt at each end is three minutes and ten seconds. The floor beams are lifted and set on their supporting girders without temporary fastening except those on column center lines which are fastened with one bolt at each end. The average time required to pick up, lift and set these floor beams in their position is one minute and three seconds.

All welding in this frame is performed in a downward position except for the vertical welding in column splices. All welding is easily accessible and can be performed in a convenient position. Welding is commenced at the center interior panel and proceeds toward the pe-

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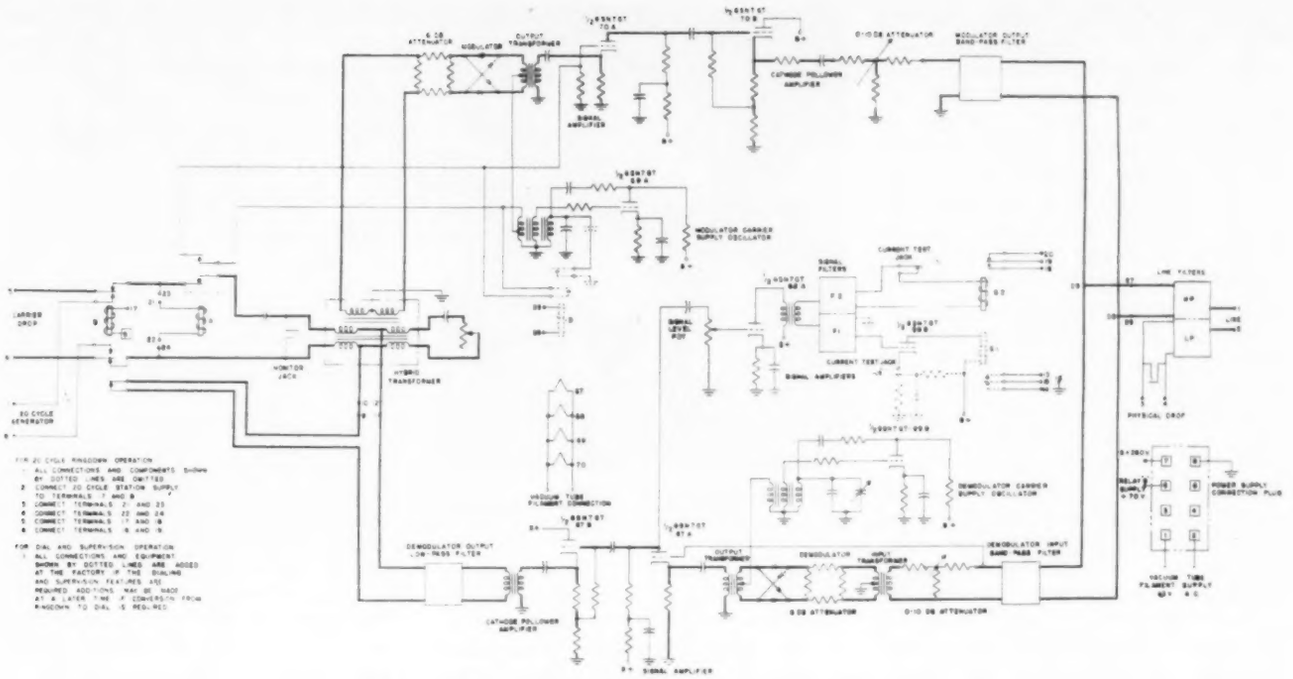


Fig. 2—Type SD Terminal Schematic Diagram.

The ADLER SHORT HAUL Carrier Telephone Equipment

By

E. G. BROWELL

Project Engineer, Stromberg-Carlson Co.

Introduction

DURING RECENT years, increasing interest has been shown by those associated with the Independent telephone field in the development of carrier telephone systems as a means of providing additional talking circuits utilizing existing wire facilities. During the past two years, this interest has increased rapidly because of advances in material and labor costs as well as the shortage of construction materials. In addition, the installation of a carrier channel is relatively simple, does not add to the right-of-way problem and provides a talking circuit that is superior to voice-frequency facilities from the viewpoint of quality and stability. The Independent telephone companies are interested in a carrier system that will prove economically feasible when installed for use on relatively short lines, a system that will provide for the addition of future channels as required and a system requiring the minimum of maintenance in order that successful operation may be accomplished without the necessity of acquiring highly-trained technical personnel.

The Adler Type SD carrier telephone systems are designed to provide facilities for superimposing one or two additional, independent and simultaneous two-way talking circuit over an existing pair of wires which already serve as a voice-frequency transmitting medium. Facilities are provided for either ringdown operation or dialing and supervision and these operations are accomplished within the limits of each individual carrier channel.

As a result, the remaining carrier spectrum is free of signalling channels and may be utilized for additional carrier channels. The equipment is generally used as a permanent plant installation but may also be employed with high efficiency for temporary or emergency circuits.

The Type SD systems will find their widest application on open-wire circuits varying in length from 25 miles to 150 miles. This range may be extended by use of available carrier equipment. Range of this carrier equipment is of course dependent on variables such as the characteristics of the open-wire line, the amount of intermediate cable, the number of side-lines and bridged

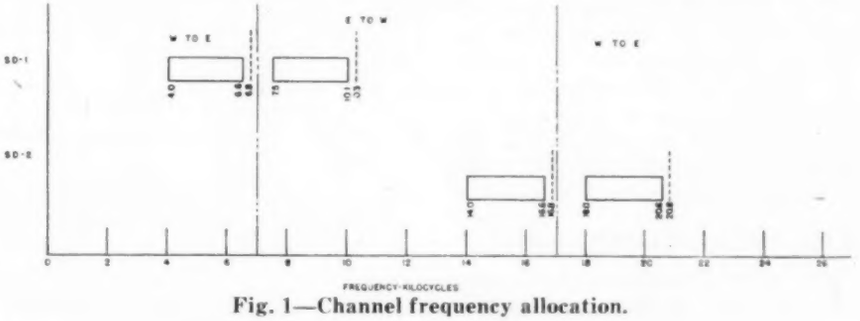


Fig. 1—Channel frequency allocation.

stations, and other similar features that would affect operation of the lines at carrier frequencies.

The Type SD carrier systems utilize copper-oxide modulators and demodulators, heater-type vacuum tubes and high quality filters made possible by the use of improved magnetic alloys. The method of transmission employed is of the single side-band, carrier suppressed type. The copper-oxide bridge-connected rectifiers employed as the modulators and demodulators provide the advantages of long and trouble-free life, minimum power consumption, improved balance and stable operation.

The Type SD systems have been designed primarily for use on relatively short lines and, therefore, no wire-circuit equalization networks are provided. For the same reason, automatic regulation of the circuit net loss is not provided. However, manually adjustable attenuators are provided to compensate for variations in circuit losses due to varying weather conditions.

The Type SD terminals and repeaters are designed to operate from the commercial 115/230 volt, 60 cycle supply, and in the event it is required that an emergency source of power be available, dynamotors and automatic change-over equipment can be supplied.

The carrier frequencies employed for each direction of transmission are as shown in Figure 1. The carrier frequencies are generated locally at each terminal and by means of careful modulator balance and suitable filters, the carriers and unwanted side-bands are suppressed, the desired intelligence being transmitted by means of a single side-band. Selected frequencies for each direction of transmission are in accordance with the accepted practice.

E. G. BROWELL, project engineer, Stromberg-Carlson Company.

Type SD Terminal Operation

THE TYPE SD carrier terminal panel includes all the equipment required at a terminal with the exception of the power supply and the line filter balancing unit. Included on this panel is the hybrid coil and its associated balance network, the modulator, demodulator, transmitting and receiving amplifiers, carrier supply oscillators, signalling equipment and the various filters and attenuators. The terminal panel occupies 14" of vertical rack space and is suitable for mounting on the standard 19" relay rack.

Four vacum tubes are required on each terminal panel and are all of the same type. A circuit diagram of the Type SD terminal is shown schematically in Figure 2. This diagram will serve to represent either an east or west terminal but it should be clearly understood that there are variations in the oscillator frequencies and the filters.

The incoming voice currents enter the terminal equipment from the switchboard or switch-train via the carrier drop terminals and, after passing through the hybrid coil, are fed to the modulator through a fixed 6db attenuator. The output of this attenuator is connected to a copper-oxide balanced modulator consisting of four bridge-connected copper-oxide dry-disc rectifiers.

A carrier voltage of 0.3 volts is supplied from the oscillator to the modulator, being impressed at the mid-points of one winding of the hybrid coil and the modulator output transformer. In this circuit, the incoming voice-frequencies are combined with the impressed carrier frequency resulting in the production of side-band frequencies. Careful balance of the modulator circuit components serves to largely balance out the carrier frequency.

Currents present in the output winding of the modulator output transformer include voice-frequencies and the upper and lower side-bands of the carrier supply frequency. These currents are passed through the transmitting amplifier and thence through a cathode-follower amplifier, the output impedance of which is 600 ohms, to the input of the transmitting level attenuator. This attenuator is adjustable from the front of the terminal panel in steps of 1 db from 0 db to 10 db.

The output of the transmitting level attenuator is passed through the modulator band-pass filter which serves to suppress all of the unwanted frequencies and allows only the desired side-band to pass through

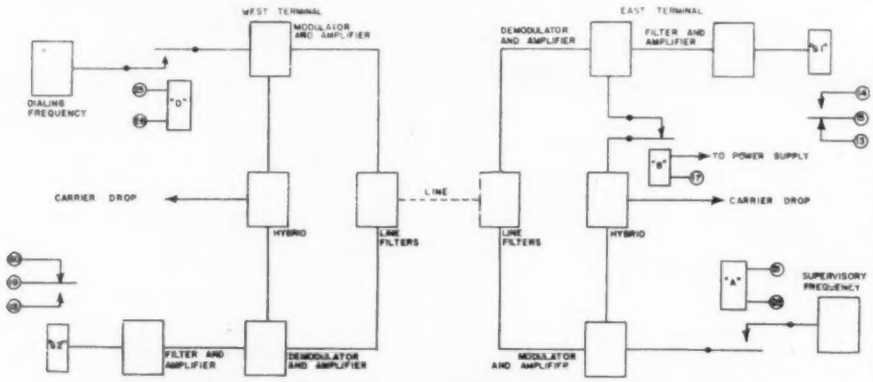


Fig. 3—Block diagram showing typiçal dialing and supervisory functions.

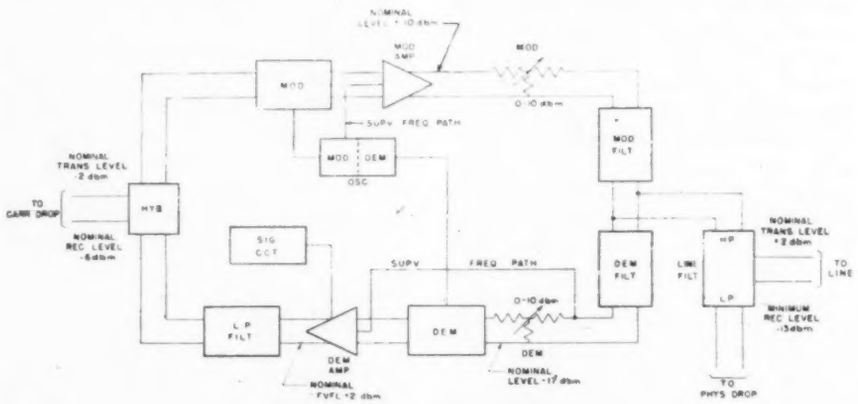


Fig. 4—Nominal transmission levels.

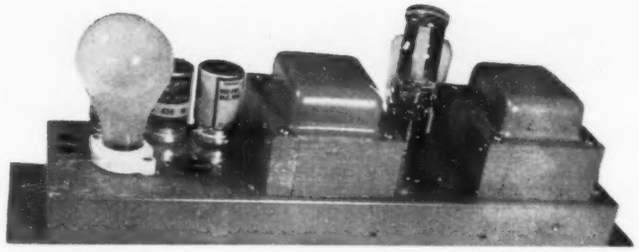


Fig. 5—Type SD Power Supply unit.

to the 4 KC high-pass line filter and thence to the line. The 3 KC low-pass filter prevents carrier frequencies from entering the physical drop circuit.

The incoming signals, after passing through the 4 KC line filter are selected by the proper directional filter and impressed on the input of the receiving level attenuator. This attenuator is adjustable in steps of 1 db from 0 db to 10 db and serves to regulate the signal input level to the demodulator.

The demodulator oscillator serves to resupply the carrier frequency. This carrier voltage of 0.5 volts is impressed on the modulator circuit between the mid-points of the demodulator input and output transformers. The incoming signals pass through the input transformer and a fixed 6 db attenuator and are combined with the carrier frequency. In this process of demodulation, sum and difference frequencies are produced, among these being the voice-frequency signals. All frequencies are amplified by the receiving amplifier and passed through the cathode follower amplifier and its associated output transformer to the demodulator output filter.

The demodulator output filter functions to allow only the desired voice-frequencies to pass, attenuating all unwanted demodulation frequencies. The required frequencies pass through the hybrid transformer to the carrier drop and thence to the switchboard.

The Type SD terminal panels are universally wired for either ringdown operation or dialing and supervision and are equipped at the factory to the customer order. If a carrier channel is initially placed in service on a ringdown basis and at a later date it is desired to convert the equipment to provide dialing and supervision features, those components and connections shown by the dotted lines in Fig. 2 must be supplied.

The operation of the Type SD carrier equipment on a ringdown basis requires that the 20 cycle station supply be connected to east and west terminals. In order to ring through from west to east, 20 cycle current is impressed on the carrier drop, causing the "A" relay to operate. This relay operates to disconnect the carrier drop circuit from the hybrid transformer and to impress the modulator carrier energy on the input grid of the amplifier tube 70A. The carrier is amplified and transmitted to the east terminal. At this terminal the carrier passes through demodulator band-pass filter to the input grid of the demodulator amplifier tube 67A.

The received carrier is also applied to the demodulator but when combined with the demodulator oscillator output of the same frequency, the net result in the output winding of the demodulator transformer is zero.

The carrier signal is amplified by the vacuum tube 67A and this signal impressed on the input grid of the signal amplifier tube 68A. A signal level control potentiometer, adjustable from the front of the terminal panel, is provided for control of the signal level input. The output of the signal amplifier is passed through a narrow band-pass filter incorporating along with the filter elements, a dry-disc rectifier. The rectified output is then applied to the sensitive relay "S2" that in turn functions to operate the relay "B". Operation of relay "B" opens the carrier drop to the hybrid transformer and connects the station 20 cycles source of supply to the switchboard over the carrier drop for signalling. The "S2" relay circuit is provided with a jack by which the through its associated linkage equipment. The "B" relay is then operated circuit current may be observed. The magnitude of this current is controlled by adjustment of the signal amplifier potentiometer.

The operation of the Type SD carrier equipment to provide for dialing and supervision requires, in addition to the properly equipped carrier terminal, suitable linkage equipment that will serve to adapt the particular dial exchange features for operation over the carrier channel. Design of suitable linkage equipment is of course dependent on the dial equipment features and requirements furnished by the customer.

All dialing and supervision functions are performed within the individual carrier channels. As a result, the portion of the frequency spectrum allocated for a channel is kept at a minimum and allows for the immediate use of a second channel or its installation at a later date as the traffic demands.

In order to describe the functions of the Type SD equipment when equipped for dialing and supervision a typical arrangement for operation is shown by means of the block diagram Figure 3. The diagram is shown for the condition when the calling party is located at the west terminal or initial transmission is from west to east.

Upon origination of the call in the west terminal, the "D" relay is operated from the linkage equipment at the west terminal. Operation of this relay serves to lower the modulator oscillator carrier frequency by 1955 cycles and the resulting signal of 4845 cycles is transmitted to the east terminal. This frequency is combined with the demodulator oscillator frequency of 6800 cycles at the east terminal, and the resulting sum and difference frequencies amplified. The narrow band filter allows only the difference frequency of 1955 cycles to pass and this frequency is again amplified and the relay "S1" operated to seize the dial quipment at this east terminal

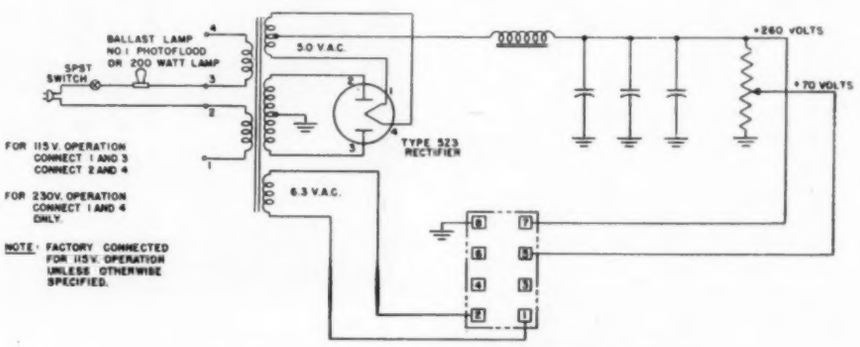

BALLAST LAMP NO.1 PHOTOFLOOD OR 200 WATT LAMP
SPST SWITCH
FOR 115 V. OPERATION CONNECT 1 AND 3 CONNECT 2 AND 4
FOR 230V. OPERATION CONNECT 1 AND 4 ONLY.
NOTE: FACTORY CONNECTED FOR 115 V. OPERATION UNLESS OTHERWISE SPECIFIED.
5.0 V.A.C.
6.3 V.A.C.
TYPE 523 RECTIFIER
+260 VOLTS
+70 VOLTS

Fig. 6—Type SD power supply schematic diagram.

to remove all signal input to the hybrid transformer. Operation of the east linkage causes the "A" relay to function and a signal of 10300 cycles is transmitted to the west terminal. This frequency is received at the west terminal and enters the west demodulator and is also impressed on the input grid of vacuum tube 67A. (See Figure 2). Combination of the west demodulator oscillator frequency and the incoming signal frequency results in a west demodulator output of zero owing to equality of the frequencies.

The signal frequency is amplified by the vacum tube 67A and impressed on the input grid of the vacuum tube 68A through the signal level potentiometer. Additional signal amplification is obtained and

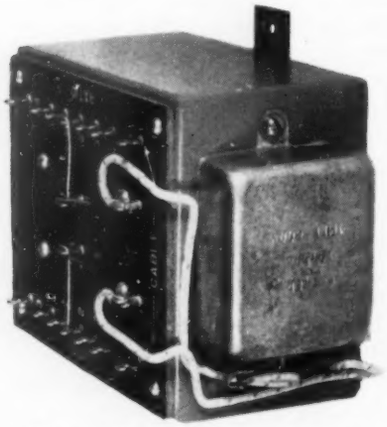


Fig. 7—310D Auto transformer.

the output of this stage passed through the narrow-band filter F2, rectified and employed to operate the sensitive supervisory relay "S2". The resulting operation of the west linkage equipment enables the calling party or the originating operator to listen for a dial or busy tone or to receive a start dialing signal.

If all is in readiness for dialing the calling party may dial, the "D" relay following the dial pulses and in turn causing an interrupted frequency of 4845 cycles at the dial rate to be transmitted to the east terminal, there to be demodulated, amplified and impressed on the "S1" relay. This relay will follow at the dial rate and through the east linkage equipment, operate the dial switching equipment. When the called party answers, the linkage equipment operates to restore all relays at the east and west terminals and conversation begun. At the conclusion of conversation and either party hangs up, the linkage equipment operates the supervisory relay "A" whereupon the corresponding relay "S2" operates through its associated linkage equipment to provide for a disconnect signal or to make the disconnect automatically. Operation of the system in the reverse direction is accomplished in a similar manner.

Fig. 9—Type 2A transfer filter set.

Transmission Characteristics Of the System

AUDIO-FREQUENCY response, from carrier-drop to carrier-drop is flat within 2 db over the voice-frequency band from 300 to 2700 cycles per second. This relatively flat characteristic is obtained by the use of high quality components in filter construction and careful circuit balance.

Terminal gains are such that a 0 db net-loss talking circuit may be obtained over a line having an attenuation of 15 db at the highest carrier frequency. This is equivalent to approximately 85 miles of 104 mil open-wire copper line, operating under wet-weather conditions. For each mile of entrance or intermediate cable (19 gauge), properly matched, the above figure must be reduced by approximately 20 miles.

Figure 4 shows the nominal transmission levels of the voice-frequencies for both the transmit and receive paths of the terminal equipment. The nominal input level from the carrier-drop may range from 0 to -6dbm (reference to 1 milliwatt in 600 ohms). The 0-10 db modulator attenuator can be adjusted to give a nominal transmit output level of plus 2 dbm onto the line. At the receive terminal the minimum input from the line may be down to a minus 13 dbm. The 0-10 db modulator attenuator can be adjusted to give a nominal receive path output level of between minus 4 dbm to minus 6 dbm.

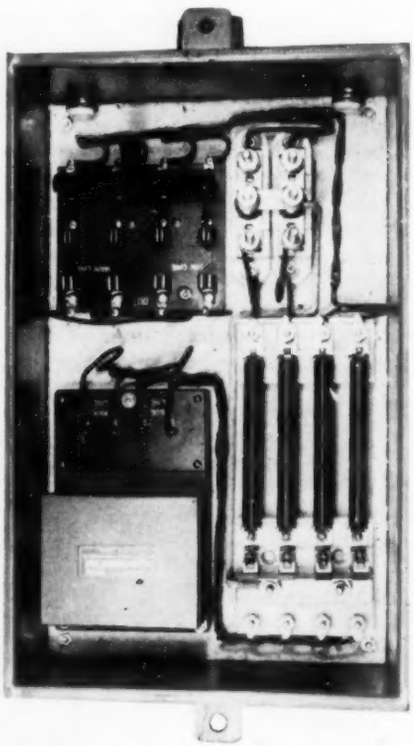


Fig. 8—Type 1-B side-line filter.

However, if a higher output level is desired, the modulator and demodulator attenuators can both be set so that the transmission levels may be increased to provide a 0 db circuit over a 15 db line. In other words, if an input level of 0 dbm from the carrier-drop is set into the system, the attenuators may be set to give a 0 dbm output into the carrier-drop at the opposite terminal with a 15 db drop in the line connecting the two terminals.

The transmission of the supervisory signals and dialing pulses is made at approximately the same level as that of the voice, thus any possibility of cross-talk or cross-ringing between two channels of a short-haul system, or other adjacent circuits is at a minimum. For ring-down operation the normal ringing current has been transmitted at the carrier frequency which is zero-frequency for the voice-band, stimulating a d-c connection which has no effects to the voice transmission. The same is true for the supervisory signal of a toll dialing system.

The supervisory frequency originates at the modulator oscillator and is fed into the modulator amplifier as shown in Figure 4. The nominal transmit level of this supervisory signal to the line is at approximately plus 9 dbm. At the receiving end the signal by-passes the demodulator and its associated attenuator as also shown in the Figure 4. Adjustment of the received supervisory signal level is made by the signal level potentiometer in the signaling circuit for proper operation of the supervisory relay.

Type SD terminal equipment requires approximately 260 volts D.C. as a "B" or vacuum tube plate

(Please turn to page 64)

WASHINGTON

Bureau REPORTS

BY ROLAND DAVIES and FRED HENCK

FCC

THE THREE-PRONGED assignment given by Congress to the FCC 13 years ago apparently is becoming too large for any group of seven men subject to political appointment and confirmation, however great their capabilities. And this is true despite fact that the Commission, with its high proportion of career and merit appointments in recent years, perhaps has the highest caliber at the executive level of any comparable agency in Washington.

In the fast-moving postwar picture—as different from 1934 as a movie is from a still photograph—each Commissioner is faced with three man-sized jobs, all of which are steadily developing in fundamental importance to the national economy and policy. But at the same time, all three are tied together by basic issues of FCC policy which must be solved to the benefit of all and the detriment of none.

It is rapidly becoming apparent that nowhere in Washington, with the possible exception of Commission headquarters, does there exist any conception of the magnitude to which the areas governed by FCC regulation have grown. The potential uses of the radio spectrum and the communications art are so numerous, so significant, and so tremendous that even close observers of the FCC and the industries involved are confronted with such a plentitude of trees that the limitless forest goes without notice.

But despite this burgeoning of the requirements of the nation for an up-to-date concept of the agency which must make decisions which will shape the future of vast media of public service, business and social contact, information and entertainment for years to come, no one has come forward with a broad overall view of the Commission's needs and responsibilities.

In the most recent opportunity for such a statement, at the hearings on the White Bill, virtually all witnesses were concerned with the immediacies of the FCC's regulation of radio broadcasting. There was honest difference of opinion as to what standards the agency should use in licensing stations, but little apparent grasp of the fundamentals of a job which perhaps is becoming too large for many minds to conceive.

It was conceded that the times have outstripped the Communications Act, and the commission which was its child. But legislation dealing with such matters as broadcast program regulation, however much it may be needed, hardly will provide any of the fundamental requisites which must be supplied if the FCC is to perform successfully the many duties which Congress—as well as the huge expansion both of the communications art and the public needs radio and telecommunications can supply—have given it.

Consider the problems presented in three main fields:

(1) Inflation, population growth, the international situation, and greatly increased desire and need for service, have changed the face of all common carrier forms of communication. The telephone industry is growing rapidly; its expansion and its need for a better-balanced interstate rate structure present problems which are to a degree the FCC's. International communications, so vital to the nation's foreign policy, provide basic issues which again are the Commission's to a substantial degree. Domestic telegraphy, although its present requirements for higher rates have been filled, certainly requires highly efficient and intelligent regulation under modern law and policy.

(2) The surface has barely been scratched in the multitudinous mobile, special and emergency radio services. Almost every U. S. industry has some need for such service. The public will expect and demand adequate highway and urban mobile service. Aeronautical and ship radio and navigation systems are vital to our commerce. The Citizens' Radio Service will open almost undreamed-of possibilities.

(3) Certainly adequate publicity has been given the complete changeover in the broadcasting industry, with the great increase in the number of standard broadcast stations and the fields opened by FM and television.

All of these, setting forth huge responsibilities and opportunities for the FCC in themselves, also must be weighed in their relationship to the others. Spectrum space allocations are continuing to be an almost insuperable difficulty, with recent developments affecting the general mobile field effectively pointing this up. And there will be other fundamental issues of nearly equal magnitude.

With all of these problems, added to the day-by-day responsibilities of the FCC which in themselves are more than full-time jobs, the agency has been forced under the present situation to limp along without even keeping current on its routine workload. The highly important and necessary participation of three Commissioners at the Atlantic City Conferences kept the agency on a "Board" status, with cases requiring a quorum deferred. The equally significant international assignments given Commissioners Jett and Webster for early 1948 again of necessity will slash the available man and brainpower of the FCC. To add to all this, the agency has lost one of its most able Chairmen, and because of political considerations his chair will not be filled at least next January.

No ready solution is apparent. Divisional operation, probably a step in the right direction, will not halt the inroads made by vacancies on the Commission and important special assignments. What first meets the eye in attempting to provide answers is (1) an increase in the number of Commissioners, with a board, committee, or division system and overall coordination of those groups, and (2) making FCC service more attractive through higher pay and fewer recriminations about broadcast station grants.

But it is to the urgent and vital interest of the industries involved and the people who use the services those industries provide to drive home that 13 years have made a lot of difference.

500-Station Exemption

TELEPHONE operators in exchanges of less than 500 stations should be treated no differently than residents of the same locality working for another company engaged in interstate commerce, President Joseph A. Beirne of the Communications Workers of America declared in an appearance before a House Education and Labor subcommittee studying the Fair Labor Standards Act.

Mr. Beirne, also advocating that Congress raise the present statutory minimum wage to 75 cents an hour, contended that there would be little or no effect on telephone wage minimums in such a law because few Bell System starting rates are below $30 weekly, adding that in the Independent industry progression schedules usually bring individual workers' pay above that mark in a somewhat longer period. Questioned closely on the possibility that lifting of starting rates would lead to demands by higher-paid employees that they be raised in proportion, he admitted that such might be the result, but he emphasized throughout his testimony that the experience of the CWA membership is that they cannot live on less than 75 cents an hour.

Much of the questioning of the subcommittee members was directed at broad minimum wage policies rather than the exemption of the telephone operators in small exchanges. Mr. Beirne was interrogated particularly on his views concerning whether Congress should set a wage floor based on living costs in the least expensive state or the most, or an average. The CWA leader said he was not in a position to answer that question, and that Congress should take into account all available relevant data.

It is felt, however, that while present Congressional thinking on both sides of the aisle is in favor of some boost in the minimum, the ultimate outcome will be a wage floor of about 60 cents an hour, rather than the frequently-reiterated recommendation of 75 cents.

Mr. Beirne, recalling that his union had offered several alternatives to complete elimination of the 500-station telephone exchange exemption, including exclusion of individually-owned exchanges of 300 stations or less with one or two operators, and cooperatives and farmer mutuals, said the alternatives had been proposed only "in the spirit of compromise." He termed the telephone exchange exemption "class legislation", arguing that operators in the exchange should not be treated any differently than workers of other companies in the same community.

"Turn your head dear, she's the worst party line gossip in town!"

Telephone Labor Pot Continues to Boil

THE TELEPHONE labor situation has continued to show up as a vigorous two-way battle, with recent developments including announcement by the CIO Telephone Workers Organizing Committee that TWOC will serve wage increase demands next year and the CWA's disclosure that it has completed its organization plans for Long Lines and Western Electric installation workers.

TWOC Advisory Chairman Allen S. Haywood said wage increase demands will be forthcoming because "that's what we're set up for." He declared that pay boost demands will come whether or not Congress is successful in checking price rises because "profits warrant it."

Increased Rates for Andrews, North Carolina

The North Carolina Utilities Commission approved application of the Andrews (N. C.) Telephone Company for authority to put into effect the following rates at its Andrews exchange:

	1-Party	2-Party	4-Party
Residence	2.50	2.00	1.75
Business	$4.00	$3.25	$2.50

The installation of a new switchboard, the increased cost in operating expenses, and the fact that the company made no profit last year were reasons given for the increase.

The commission stated that from the showing made by the company it was apparent that the company should have increased revenue.

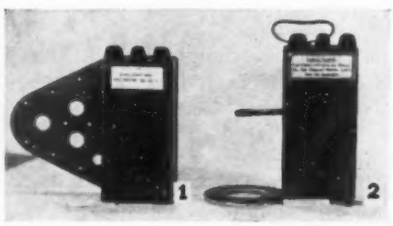
Install PAY STATIONS for Extra Revenue

3-Slot Type for 5c-10c-25c Coins

No. 11 for wall telephones ..... **$11.00** ea.

No. 11 with built in signal transmitter ..... **$14.00** ea.

No. 14 for portable desk telephone ..... **$14.00** ea.



also

Kellogg desk Stands with new cords

and

Ringer box in new oak cabinet.

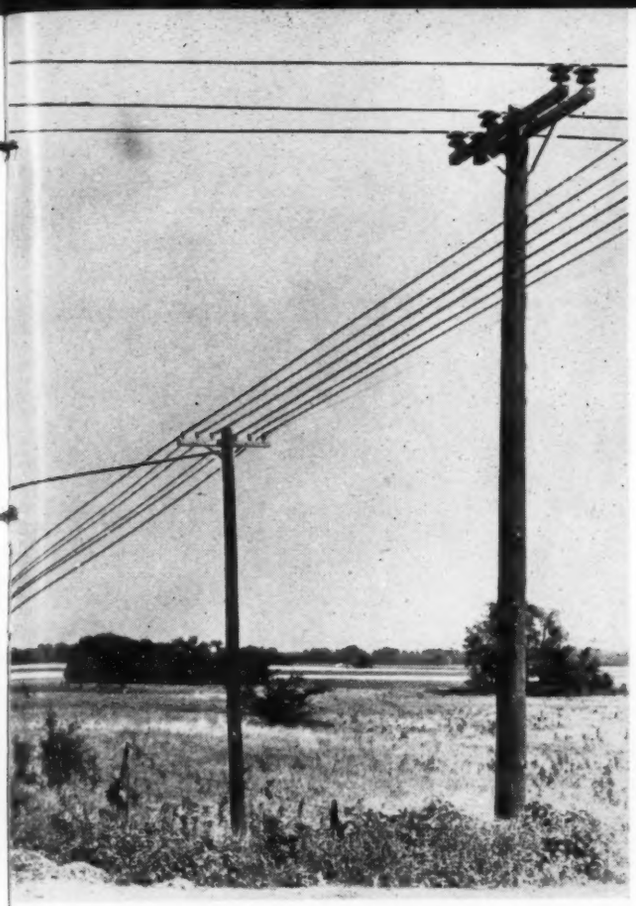
Alnico generator and 1600 ohm ringer, **$17.00** per set.

DAN'L H. McNULTY, President & Manager

'Since 1926'

TELEPHONE REPAIR & SUPPLY COMPANY

1760 Lunt Avenue Chicago 26, Illinois



PRACTICAL--

"HOW TO DO IT"

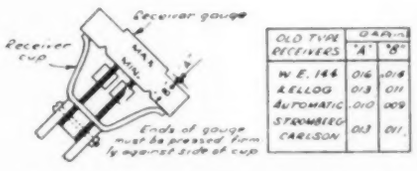
SUGGESTIONS...

by

MYRLE SHAFER

ADJUSTING RECEIVERS FOR MAXIMUM TRANSMISSION . . .

WALL SET and desk stand receivers that reproduce speech poorly can be restored to their former efficiency by adjusting the air gap between the pole pieces and the diaphragm. As illustrated in Figure No. 1, a sandpaper block, a receiver gauge, and a McNulty file are used for adjusting the receivers. A heavy mill file is also needed. First the receivers are dusted off and tested for continuity of the coil windings, preferably with an ohmmeter. Each receiver is then lightly passed over the sandpaper block to detect bent or dented rims, which require restraightening and smoothing down on the block. The receivers are then checked with the receiver gauge for maximum or minimum air gap as indicated in Figure 2. If the gauge "goes" on the maximum side of the gauge, the rim of the receiver cup is filed down and smoothed off on the sandpaper block until the gap is correct. If the gauge will not "go" on the minimum side, the pole pieces of the receiver are filed down with the McNulty file to increase the air gap to the proper value.



OLD TYPE RECEIVERS	GAP-in "A"	GAP-in "B"
W. E. 144	.016	.018
KELLOG	.013	.011
AUTOMATIC	.010	.009
STROMBERG	.013	.011
CARLSON		

Fig. 2—Use of gauge for adjusting receiver air gap.

• • •

BARRAGE BALLOON ANTENNA . . .

A USE FOR war surplus balloons has been found by a power company in connection with the problem of experimentally determining the minimum height antenna required to give adequate coverage in an area to be served by a mobile radio-telephone system. Although equations can be used to compute optimum antenna heights, local factors sometimes result in the actual signals being far different from what computations might indicate. The utility company in question thought the real method would be an actual field test with antennas of various heights, after which the antenna towers could be ordered with some assurance that they would give grade-A results.

The high cost of antenna towers makes it highly desirable that they be kept to some minimum height which is adequate to lay down a signal over the area to be operated in but without an unnecessary excess height. The company in question purchased a barrage balloon from available surplus military stocks and used it to support a half-wave antenna which was connected to a radio transmitter mounted

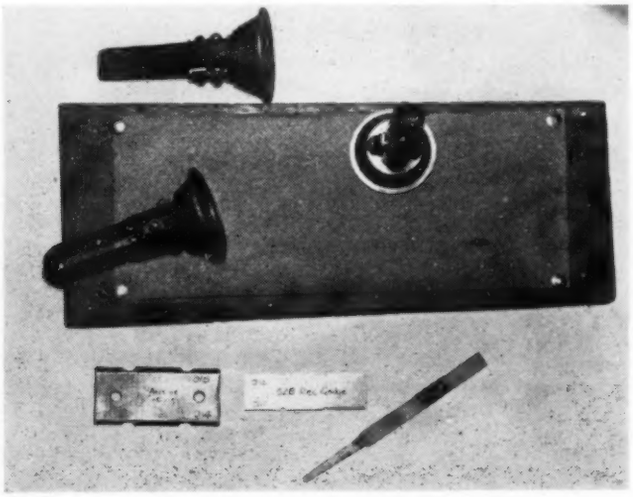


Fig. 1—Tools for use in readjusting receiver air gap.

Telephone

ONE TELEPHONE IS BOTH WALL AN

Leich MANU

AND DESK MODEL . . .

SAME CASE—
SAME BASE—
SAME EVERYTHING

•

NOTHING TO CHANGE
ADD OR BUY

•

NO NEED TO BUY OR
STOCK EXTRA
HOUSINGS

Now—you can stock one telephone and meet every service need. You use the same case, same base, same everything for both desk or wall model. Set this new Leich telephone down, and it's a desk phone—hang it up, and it's an attractive, convenient wall telephone. Even on dial models, you simply remove two screws and turn the dial around in the case. This takes about one minute.

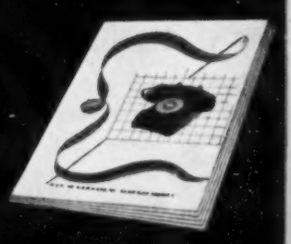
Just think what this means to you! Less stock, less investment, less fuss and bother. In many cases it will enable you to install a wall phone by demonstrating it as such. And wall phones, as you probably know, mean fewer service calls.

There are many new design improvements in this practical new Leich telephone. It's the easiest-to-service telephone we've ever developed.

Why not write for the literature described at the right, which gives complete information.

CATALOG NOW AVAILABLE

Describes the new Leich telephone in full detail, complete with ordering information. No charge or obligation. Write today. Address Leich Sales Corporation, 427 West Randolph St., Chicago 6, Illinois.



MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE 1907

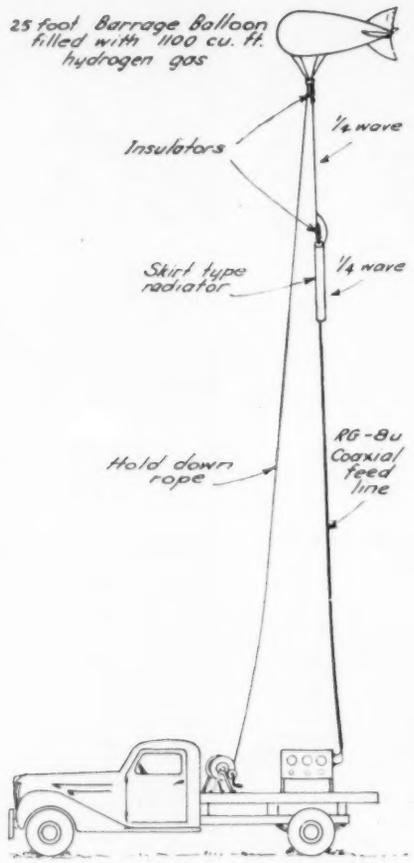


Fig. 3—Use of war-surplus balloons to check for tower height.

in a truck. The results were extremely satisfactory.

It was found in one instance that with this arrangement a 125 foot tower would be too short but a 200 foot antenna just right. The balloon used was approximately 25 feet long and had a total weight of 40 pounds when filled with 1100 cubic feet of hydrogen. The net lifting capacity of the balloon was approximately 50 pounds. A balloon of this type cost about $90.00. The savings through its use were many times this amount. The antenna was fed by a coaxial cable (RG-8-U) and the one-half wave antenna was fed at the center using a one-quarter wave duraluminum parasitic radiator for the lower half of the antenna. Fig. 3 illustrates the general features of the experimental installation. Telephone companies faced with similar problems in connection with Urban or Highway Mobile Radio-telephone Service may find this scheme of interest.

• • •

CLIMBER AND BELT MAINTENANCE . . .

A RECENT accident which was traced to improperly sharpened climber gaffs, emphasizes the need for greater care and better instruction on this phase of tool maintenance. Dull or improperly sharpened gaffs are a serious life hazard. Some of the larger companies are now issuing detailed instructions for their men to follow in sharpening climber gaffs. These instructions state essentially as follows (See Fig. 4):

(1) Clamp the climber in a vise with the inside surface of the gaff up. Small blocks of wood can be used to prevent marring the sides of the climber.

(2) Using a sharp second cut mill file held flat against the gaff surface, file across and down towards the point. Use only a forward stroke and raise the file on the back stroke.

(3) File so that the entire inside surface of the gaff is perfectly flat and straight except near the point.

(4) Starting at a point about 1/8th inch back from the point, rock the file slightly to round the surface into a shoulder toward the point.

Filing should be done only on the flat side and never on the ridge of the gaff. Gaffs should be replaced or the climbers discarded when the distance from the heel to the point is 1⅛ inches or less.

Care should be given climber and safety belt leather. They should be periodically examined for cuts, cracks, tears, enlarged buckle holes etc. Stitches should be carefully scrutinized for breaks or loose or rotted threads. An inspection of the D rings and buckles should reveal cracks or fractures which might weaken these items.

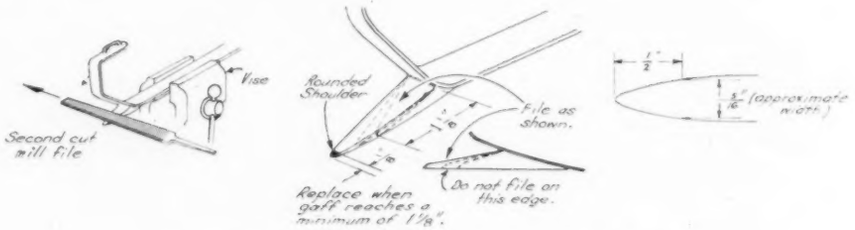


Fig. 4—Correct method of sharpening climbers.

Leather should be cleaned and dressed every 90 days in order to keep it in a pliable condition. All dirt should first be removed with a damp sponge. It should then be thoroughly lathered with a good grade of saddle soap. Next wipe off with a dry cloth. While the leather is still moist, a good leather dressing should be worked into the pores with the hands. Leather goods should be allowed to dry 24 hours before being used and then wiped off to remove excess oil.

Periodic inspection and maintenance of linesmen's climbers and belts not only insures longer life for these items but tends to minimize accidents due to faulty equipment.

• • •

NEW ELECTRONIC MEASURING SET . . .

IT WASN'T so many years ago that few field type instruments were available to Independent telephone companies by which they could quantitatively measure the high impedance, low voltage voice frequency waves present in telephone circuits. Laboratory type (thermo-couple) instruments have of course, been available for many years but these instruments were hardly suitable for day to day field measurements. Development of the copper-oxide instrument rectifier and improved types of vacuum tube voltmeters have given the communications industry new measuring instruments that have an unusually wide range of usefulness yet are relatively low in cost.

The past few years have seen the development of a number of excellent vacuum tube voltmeters and electronic volt ohmmeters which are particularly useful for communication measurements because of the high impedance character of many communication circuits. One of the newest of these instruments is the Model 769 Weston Electronic Analyzer. This instrument is essentially three instruments in one, viz:

(1)—A conventional volt ohm-milliammeter with self contained battery source,

(2)—A high impedance electronic volt-ohmmeter using commercial A-C power.

(3)—A highly stable probe type vacuum type voltmeter for use on frequencies as high as 300 megacycles.

This instrument is particularly stable regardless of the range selected. The high stability results from the use of a D-C amplifier which incorporates both regeneration and degeneration. The drift is less than 1% with line voltage fluctuations as much as 25 volts. As it has both an internal D-C power source and can use an external

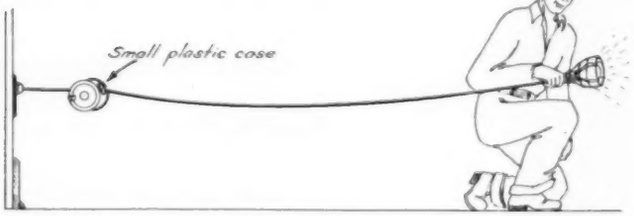
A-C source, it can be used either in the field or in the telephone office.

The ranges provided are: Six 10,000 ohm-per-volt D-C potential ranges; six rectifier type A-C voltage ranges; three ohmmeter ranges; and six D-C current ranges. All of these ranges can be used without external power. With external power it becomes a high impedance electronic volt-ohmmeter capable of a wide range of measurements, or an A-C vacuum tube voltmeter with a very high input impedance and on any frequency from 50 cycles to 300 megacycles. The voltage range is from 3 to 120 volts. This feature makes it particularly useful in connection with inductive interference investigations, as for example, measurement of the static voltage induced on a telephone line paralleled by a power line. It is also very useful for transmission measurement. The new instrument should find ready acceptance in the telephone field.

• • •

PLASTIC REEL FOR APPLIANCE CORDS . . .

COMES NOW a manufacturer with a long needed small plastic reel designed to hold excess lamp and appliance cordage. Appliance and lamp cords are usually either too long or too short. When they are too long the cord lays snarled up on the floor collecting dust and interfering with cleaning and dusting operations. The new device, which is approximately 3½ inches in diameter and 1¼ inches high, will hold about ten feet of cord. The cord can be wound in by turning the pivoted top and may be extended by a slight pull on the cord. A device of this type would seem to have application in telephone offices for desk lights, terminal room appliances such as soldering irons, etc.



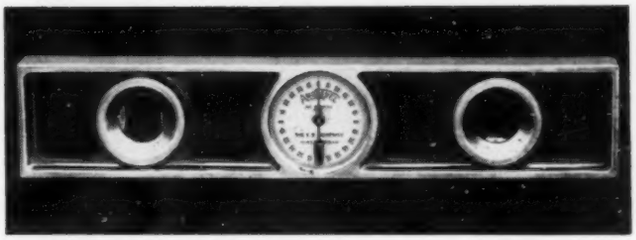
Handy reel for appliance cords.

• • •

NEW COMBINATION LEVEL AND ANGLE INDICATOR . . .

THE R. D. Company, P.O. Box, 912, Flint, Michigan, recently announced a new combination level and angle indicator known as the "Anglevel".

The manufacturer states the Anglevel is usable from all four surfaces with vials visible in ANY POSITION with the added features of quickly determining angles, slopes, pitches and inclines to a high degree of accuracy. Numerals on dial facilitate finding the relation of angular surfaces to horizontal and vertical surfaces. The tool is a refinement and improvement over conventional levels, for it offers everything that the craftsman has now, plus true and rapid measurement secured usually through the use of protractors or other expensive precision instruments.



New Level and Angle Indicator.

The Anglevel is equipped with retainers into which vials (two horizontal, two vertical) are placed and give INSTANT READINGS in these positions. The retainers can be inserted, adjusted and positively locked into position in three minutes or less and are replaceable at a very nominal cost.

The Anglevel is equipped with dial indicator which is sensitive and exact. The dial is made of clear unbreakable plastic, calibrated in degrees (0-360) and graduated in such a manner to make it practical for use by the most particular and painstaking craftsman. The frame is heat-treated aluminum, 16" long, 3" wide, ¾" thick. Weight: Approximately 1 lb. 8 oz.

◆

MICROWAVE RELAY LINK READY FOR TELEVISION . . .

A RECENT announcement by the General Electric Company stating they have completed a one-way 2000 megacycle microwave radio relay circuit for commercial television operation bteween New York City and Schenectady, indicates a desire on the part of the television interests to furnish their own transmission channels between cities in preference to using the Bell System coaxial cables which are designed to carry both television programs and regular telephone toll circuits.

In the new link set up, extremely directional beams will be transmitted from a transmitter on top of the General Electric Building in New York to a relay station on Beacon Mountain 55 miles north of New York. From this point they will travel 55 miles to Round Top Mountain, thence, 29 miles to the Helderberg Mountains, then on to the Schenectady terminal 14 miles away. At a recent F.C.C. hearing C. A. Priest, manager of the G. E. transmitter division testified that his company would like to extend microwave relay circuits between several points. In the testimony given, the G. E. representative explained that their proposed microwave relay system would bring television programs to the great majority of residents of upstate New York and lay an excellent foundation for the expansion of the network either by additional channels over the area or by extension into new areas. Mr. Priest made a plea for an adequate number of channels for intercity relaying of television programs.

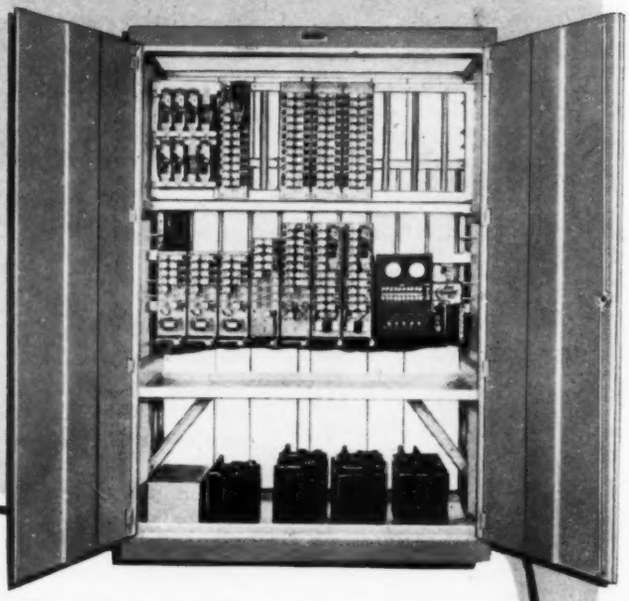
The Bell System has already demonstrated the complete practicability of coaxial cable for the carrying of television programs and it would seem that these television interests could well afford to take advantage of the coaxial cable networks now being established by the Bell System. The A. T. & T. Company's recent announcement that the fee for inter-city coaxial cable facilities between New York and Philadelphia would be $5,800 monthly should give the television people some idea of the comparative costs of coaxial vs microwave relay links for their intercity television program. Coaxial cable would have the distinct advantage of serving radio frequencies and would not be subject to the fading difficulties inherent to some of the microwave frequencies. When the smoke has all cleared away it may well be that coaxial cable will prove cheaper than an involved system of microwave links.

...both towns

Gold Hill has...

an Automatic Electric

FULL AUTOMATIC SWITCHBOARD



The Automatic Electric "Full Automatic" switchboard operates under control of the dial on each telephone, to complete the connections desired. Lines may be metallic or grounded, with a maximum of 20 telephones per line. Service is fully automatic—available every moment of the day, every day of the year. Operation of the automatic telephone is simple and easily learned, and places connections entirely under control of the subscribers. Permits use of the most modern types of automatic telephones such as Automatic Electric Types 40, 50 and 43 Monophones. Toll trunks to one or any number of connected exchanges may be selected automatically—the caller simply dials a number to indicate the exchange desired.

Ask for full particulars on Automatic Electric "Full Automatic" switchboards.

Here are two towns as nearly alike on th
be. But the telephone company will tell you

In Gold Hill, subscribers are willing to pa
ice, with modern central-battery automatic
customers also pay an adequate rate for cen
for modern automatic instruments to replac

In Silver City, "switcher line" customers p
magneto telephones. Rates are inadequate f
subscribers oppose the increase necessary
service. Yet something must be done to make

Wisely, the telephone company will choos
these two towns—by installing equipment
scribers' specific needs. Whether it's "full a
matic Electric equipment will keep the subs
of their local service.

AUTOMATIC E

Originators and Developers of the Stronger Step-b
Sender-Translator Operation . . . Machine Switc
Makers of Telephone, Signaling and Communication Apparatus..Elec
Distributors in U.S. and Posses

AUTOMATIC ELECTRIC SALES CORPORATION, 1033 W
Export Distributors: INTERNATIONAL AUTOMA

...s are happy!

...y alike on the surface as two towns can

...will tell you they differ in many ways:

...willing to pay for "full automatic" serv-

...y automatic telephones. "Switcher line"

...e rate for central-battery operation, and

...nts to replace magneto telephones.

...customers prefer to keep their present

...inadequate for an operating profit—and

...e necessary for modern central-battery

...done to make this exchange pay its way.

...ny will choose different systems to serve

...equipment best adapted to the sub-

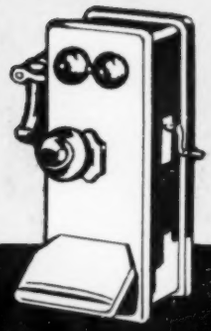
...er it's "full automatic" or R-C-X, Auto-

...eep the subscribers happy, and *proud*

ELECTRIC

...trowger Step-by-Step "Director" for Register-
...Machine Switching Automatic Dial Systems
...on Apparatus..Electrical Engineers, Designers and Consultants
...in U.S. and Possessions

...RATION, 1033 W. Van Buren St., Chicago 7, U.S.A.
...NAL AUTOMATIC ELECTRIC CORPORATION

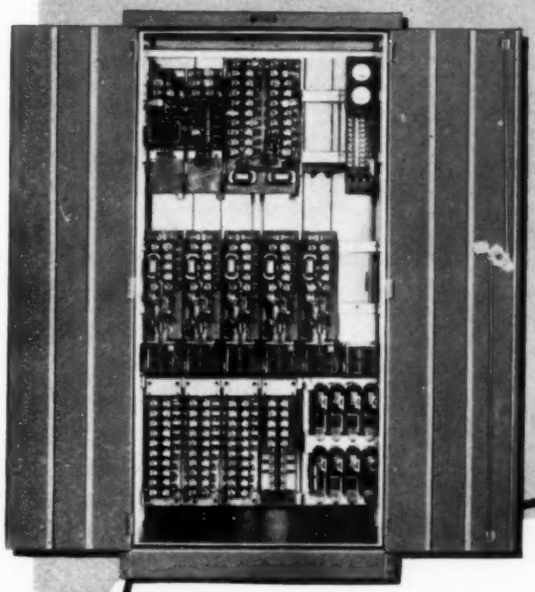


Silver City has...

an Automatic Electric

R-C-X

(Remote Controlled Exchange)



The Automatic Electric R-C-X switchboard is controlled by "full time" operators at a nearby attended exchange. Uses existing magneto telephones and lines—grounded or metallic—and permits maintaining the present number of subscribers on each line. Subscribers continue to "ring in" just as before. But instead of ringing a local operator, the subscriber's call is transferred by the R-C-X equipment over a control trunk to an operator in the "control" exchange. The control operator secures the desired number and dials it back over the same control trunk to the R-C-X, where the connection is automatically completed. The control trunk is then cleared for another call.

Ask for full particulars on R-C-X equipment for your specific needs.

Current COURT and COMMISSION Activities

N. W. Bell Purchases North Dakota Company

Sale of the Sheldon-Owega Telephone Company, Sheldon, N. D., to the Northwestern Bell Telephone Company, Fargo, was recently approved by the North Dakota Public Service Commission.

Telephone officials said the transaction involved a rural line operated privately by about 20 farmer subscribers. It will be connected into the Sheldon exchange, owned by Northwestern Bell.

◆

Idaho Commission Denies Rate Boost Application

The Idaho Public Utilities Commission has denied application of the Lemhi Telephone Company for authority to increase certain rates and charges in the Salmon exchange.

The record indicated that the telephone plant of the Lemhi company was originally constructed sometime between the years 1910 and 1914, either directly or indirectly, by the Gilmore & Pittsburg Railroad Company. The commission stated that there is nothing in the record or testimony to support the first entries on the records of the telephone company which show the investment in telephone plant at $150,000.00 for constructed lines and exchanges and $100,000.00 for rights, contracts and franchises. At the time the first entries were made, the telephone company issued to the Railroad company 1,250 shares of common stock, par value $100.00 and an interest bearing note for $125,000.00. There was later entered on the records of the telephone company adjustments that reduced the $100,000.00 entry to $78,731.80.

On June 30, 1914, the telephone company consolidated the above entries into one account, "Telephone Plant Purchased," in the amount of $228,731.80, and this account has remained in effect to the present time. There has been one addition to this account, the purchase of 10,500 shares of stock of the Red Rock and Salmon River Telephone Co. for $12,550.52. The property covered by this purchased 10,500 shares of stock was later abandoned but the commission claimed no adjusting entries have been made. When the Salmon Exchange was rebuilt, there was retired from this account $22,583.88, leaving a balance as of December 31, 1946, of $218,-698.17.

The commission stated: (1) That the reported value of the property of the applicant used and useful devoted to the public service is in excess of a reasonable amount and should be reduced; (2) that the annual depreciation expense charged to operating expenses by the applicant is greatly in excess of an amount required by the property and should be reduced, and (3) that the "evidence adduced and the records of the applicant show a fair, reasonable and adequate return upon the investment with necessary and suitable amounts for operating expenses, depreciation and all other expenses having been provided for, and it is not reasonable or necessary to increase the present rates."

◆

Southern Bell Seeks Rate Boost In Four States

Citing greatly increased operating costs and postwar wage increases, the Southwestern Bell Telephone Company applied September 30 in Missouri, Kansas, Oklahoma, and Arkansas for higher telephone rates for local service in most of its exchanges.

◆

NARUC Approve Telephone Separation Manual

Approval of the Telephone Separation Manual and consideration of three telephone regulatory proposals contained in resolutions from the Mountain-Pacific States Conference of Public Service Commissions formed the major subjects at the four-day meeting, October 20-23, of the NARUC Telephone Committee in New York.

The NARUC Committee, headed by Georgia Commission Vice Chairman Matt L. McWhorter, approved the telephone separation manual after final

➡WHAT THEY'RE SAYING . . .

Harold V. Bozell,
Chairman,
USITA Committee

"There is one tax factor in this seeking of a rate increase which is extremely punitive to the customer and, therefore, to us in getting this across. It has a snowballing effect (which I emphasized to the House Ways and Means Committee and reemphasize every time I have an opportunity to do so), such that, if we need an extra dollar of net revenue, we have to collect a sum of $1.61 from the customer—and the customer pays another 24 cents in excise tax. Therefore, for a dollar to us, the customer pays $1.85 in increased cost. In smaller companies where tax rates are in the lower brackets, this figure works out to be about $1.50.

"That same snowballing effect occurs, of course, throughout all industry. Every other industry has to collect $1.61 from the customer to get $1.00 of increased income, and this is one of those elements of the spiral of inflation which we are confronted with over every phase of our economic front."

revision of language changes and a more definite delineation of the functions of the FCC and the NARUC committee and staff group. The manual is now to be printed by the Washington headquarters of the NARUC and will be offered for sale through the NARUC with Secretary Ben Smart in charge of the latter program.

The NARUC Telephone Committee after a day's consideration of the three telephone regulatory proposals by the Mountain-Pacific Commissioners on Western Electric costs and prices, harmonizing of state and interstate toll rates and reviewing of the A.T.&T. license fee, was understood to have laid these proposals on the table after general discussion. Undoubtedly, the three proposals will be incorporated in the Telephone Committe report, including recommendations, to the NARUC Executive Committee for consideration by the latter at its next meeting. There was some thought that the license fee question might be a subject, especially in connection with the cost of money to Bell companies in A. T. & T. advances, for consideration by the NARUC Accounting Committee to determine whether any change would be necessary in the uniform system of accounts.

The three resolutions of the Mountain-Pacific Commissioners were presented to the NARUC Telephone Committee by Director A. J. Zimmerman of the Washington State Department of Public Utilities and a member of the Telephone Committee. These resolutions proposed the advisability of a joint NARUC-FCC analysis of Western Electric costs of equipment "in an effort to evaluate reasonableness of the Western Electric costs and charges to its Bell Telephone customers;" in view of several recent state commission rate orders further accentuating the disparity in intrastate and interstate toll rate schedules, the NARUC Telephone Committee was requested to undertake an exploration of "all possible avenues of harmonizing these toll rate structures, including a review of the method of allocation of the toll line components between state and interstate;" and "further discussion to determine the policy of the various commissions in regard to the license fee of the A. T. & T." with the NARUC Telephone Committee and the FCC to review and report available additional data and conclusions that will be helpful to the states in this matter.

◆

Deadline Set on Idaho Rate Boost

A rate increase granted the Mountain States Telephone & Telegraph Company in Idaho in January may not extend beyond Jan. 1, 1949, the Idaho Public Utilities commission recently ordered in its decision on a rehearing of the case in which the original boost was largely affirmed.

Some other slight modifications were made in the order resulting from the rehearing, requested by the Idaho Falls chamber of commerce.

Based on company estimates at the original hearing, the rate increase boosts revenues in Idaho by $526,000 per year—$405,000 from increased exchange rates and $121,000 in intrastate long distance tolls.

The new order made a slight revision in classification of exchanges to eliminate some "overlapping" and to make a clear-cut division in the classification. For example, under the January order there was a class I exchange, having from one to 250 stations and a class II exchange with 200 to 500 stations. Under the new order the class I is listed as one to 200 and class II from 200 to 400. Similar revisions were made through the six classifications.

Explaining that the rate case was an emergency circumstance, the commission said it was of the opinion that "the company is subject to factors having immediate impact on its expenses, although there is reason to believe that these same factors will

seals the live strength in **Taylor-Colquitt Poles**

You get stronger poles, with longer life, when you choose Taylor-Colquitt poles. The T-C method of Vapor Drying retains the live strength of the tree. It removes the moisture without checking the fibers—prepares the wood for complete and even distribution of the preservative to the still-living cells and fibers. The result is a longer-lasting pole with greater resistance to decay, and with the live strength sealed in.

Emergency stocks of these new Taylor-Colquitt poles are now available for emergency requirements.

RECOMMENDED AND DISTRIBUTED BY

AUTOMATIC ELECTRIC SALES CORPORATION

1033 WEST VAN BUREN STREET, CHICAGO 7, ILL.

cease to be effective when the company's expansion program emerges from the high inflationary cycle it has encountered."

The order said that the continuing large demand for telephones and the unfilled demand pointed to two conclusions—the future revenues will show a substantial increase and that operating expenses "will be unusually large" during expansion.

The commission also noted the labor strike in the spring this year and the settlement involving wage increases along with a loss of revenue during the "period of unsettlement."

Under the order the commission reserved the right to issue other orders prior to Jan. 1, 1949.

◆

Rate Increase for Red Cloud, Neb.

The Farmers Independent Telephone Company, Red Cloud, Neb., has received permission from the Nebraska State Railway Commission to increase rates on the grounds of increased operation and maintenance costs.

The rate boosts, first ever sought by the company, are 50 cents a month and 10 cents for switching charges.

◆

Rate Boost for Staplehurst, Neb.

The Nebraska State Railway Commission has granted the Staplehurst, (Neb.) Telephone Company authority to increase its rates 25 cents per month, effective November 1st.

◆

CWA President Testifies Before House Committee

President Joseph A. Beirne of the Communications Workers of America in testimony offered before the House Labor Committee on October 27 asked for an increase in the minimum wage to 75 cents. He also asked elimination of the exemption in the Fair Labor Standard Act for telephone operators working in exchanges having 500 stations or less, and in any event that it be limited to cooperatives with less than 300 stations and to individually owned exchanges, with a stipulation that in no instance shall the exemption be applicable to an exchange employing more than two switchboard operating employees.

In a prepared statement Mr. Beirne said that the present 40-cent minimum is "wholly inadequate under present economic conditions." In the Bell System he said the starting rate is 60 cents while in the Independent field among the workers represented by C-W-A it is 35 cents. He said one effect of increasing the minimum would be to shorten wage progression schedules. He admitted that a wage rise would bring subscriber rate applications but said that substandard wages should not be allowed to exist merely because an employer is a public utility.

". . . and the best telephone service in the world is yours for a nickel at the corner drug store."

◆

Wage & Hour Division Meets December 2

Wage-Hour Administrator William R. McComb has set a hearing in Washington on December 2 to consider a revision of the definition of the terms "executive, administrative, professional, or local retailing capacity or outside salesman" as used in existing regulations.

The United States Independent Telephone Association is planning to be represented at the hearing and present testimony on behalf of Independent telephone companies. Any person desiring to testify must notify the Administrator by November 20 giving information as to the subjects his testimony will cover and an estimate of the time required.

◆

Eastern Indiana Company Starts Expansion Program

Construction of two telephone exchanges has been started by the Eastern Indiana Telephone Company serving the Richmond district.

One of the exchanges being constructed is located at Economy. The other is at Greensfork. A third exchange will be erected at Modoc for the installation of a new automatic system to replace the present manual system.

STROMBERG-C

subscriber service improves with sturgis standard

Calm, unruffled subscriber service prevails when operators are mentally and physically well-poised.

Operators call the Sturgis No. 435-A "comfortable", unconsciously recognizing that it conserves their vitality. True, its ample Saddle Seat (16½" wide, 14½" deep), and ample Plaited Backrest (8" high, 13" wide), spell comfort. But their infinite capacity for inter-adjustment in height and depth to correctly posture operators of every type of figure is their pay-off.

Heavy, welded steel tubing (1" O.D. for base, ¾" O.D. for footrest), makes Sturgis frames indestructible. Their hair-filled genuine leather upholstery wears everlastingly.

Company, operators and subscribers profit from Sturgis correct design.

Chair Height Specifications

Seat Height Adjustment	Footrest Height From Floor	Seat Height Adjustment	Footrest Height From Floor
18" to 22"	5"	24" to 28"	10"
20" to 24"	6"	26" to 30"	12"
22" to 26"	8"	28" to 32"	13"

DISTRIBUTED EXCLUSIVELY BY STROMBERG-CARLSON

STROMBERG-C

BRANCH OFFICES: CHICAGO 6, KANSAS

G–CARLSON Recommends

reversible • weatherproof

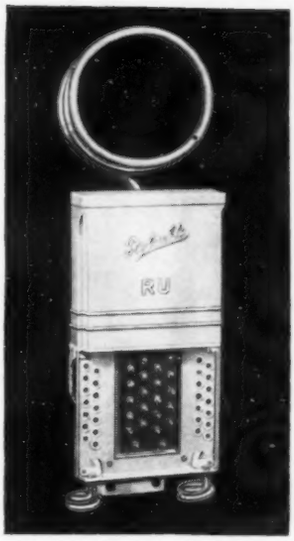
reliable "RU" cable terminal

The results of Reliable's policy of endless research and testing of parts and materials, together with a rugged design simplicity are apparent in this Reversible, Unprotected Terminal.

The flat fanning face plate, in combination with a sturdy zinc cover which surrounds the wires both front and back, creates an unusually weatherproof terminal.

The reversible sliding zinc cover also permits stub to be mounted at either top or bottom.

Such other features as: detachable mounting bracket; cast cable chamber; guide rings for jumpers; beveled washers; perfect sealing nozzle, etc. add greatly to the installation and service convenience of the Reliable "RU" Terminal, as well as providing an assurance of service life beyond actual field requirements. Ask for complete information in sizes and prices.



"Reliable" identifies the quality

hemingray insulators...

Low in service cost!

These famous insulators, manufactured by the Hemingray Division of Owens-Illinois, cost little to begin with. Their cost is still lower in service life.

Many of these insulators are still on the job after 20, 30—and even 50—years of active service.

They stand up faithfully against rain, snow, and sleet. They are unaffected by the hottest days of summer, and the coldest nights of winter.

Wherever insulators are needed—those who know the best specify "Hemingrays."

HEMINGRAY No. 16
Has square groove which provides substantial support for line wire.

cook no. 3800

central office protector

Combines cable termination with protection of central office personnel and equipment against high potentials and sneak currents. In operation, it opens the switchboard circuit, grounds the outside line, and operates an alarm circuit. Note these construction and operating features:

1. Provides for temporary disconnect.
2. Self-soldering, low-resistance heat coils easily reset after operation without changing, reversing or re-soldering coils.
3. Line and switchboard connections on opposite sides of protectors.
4. Steel mounting plate for maximum strength.
5. Unit dischargers, consisting of two carbons, separated by acetate dielectric cemented together, permanently grounds the outside line under continuous discharge.
6. Easily tested without removing heat coil; withdrawal of test plug leaves protector in operating condition.

G–CARLSON FACTORY, GENERAL OFFICES: ROCHESTER 3, N. Y.

O 6. KANSAS CITY 8. SAN FRANCISCO 3. IN CANADA: STROMBERG-CARLSON COMPANY LTD. TORONTO

STROMBERG Telephone CARLSON

Employee Medical Service For Small Companies

by Ernest W. Fair

ABSENTEEISM in the telephone office means losses for both the telephone office and the employees as well. And experience records have shown that just about half of the cases of absenteeism in business today result from illness of one kind or another.

The large industrial organizations of our country have long recognized this; and they have found how profitable it is to do their utmost to reduce this sickness absenteeism as much as possible. The elaborate and precautionary methods they undertake to arrive at this goal are beyond the means or scope of the small telephone office. Yet there is much that this telephone office management can do to keep down such losses through absenteeism . . . much that can be done at very little cost.

Such effort begins with the establishment of a plan of application for the telephone office. In the paragraphs that follow we shall present tested ideas from proven experience that may be used as part of any such plan in any size telephone office. Each individual reader can readily adapt such items of the whole as he desires to the scope of his own plan and to fit the budget requirements he has set up.

Medical Services

THERE SHOULD be a definite plan for medical services and this should be organized in cooperation with a doctor; the same physician who is to have a part in the program. He should thoroughly understand the firm's objective in obtaining the maximum freedom from illness for its employees and at the minimum of expense as his first planning effort.

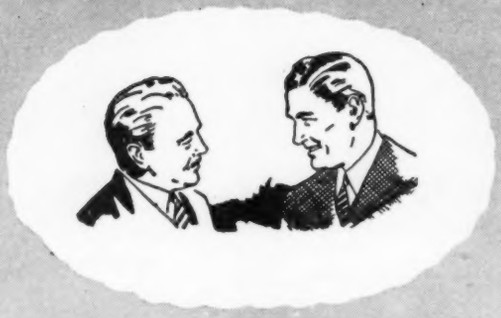
Often good results can be secured by using local clinics, dispensaries or hospitals or cooperating with other firms by utilizing joint facilities where the firm's budget does not permit retaining a regular doctor of its own. Whatever is done, however, at no time should poorly trained persons lacking professional qualifications for first-aid work and preventive medicine ever be given a part of the program.

One of the best points to inject into such a program is a prehiring examination. Such an examination is well worth whatever the cost for it will weed out the employes who are highly susceptible to illness or who are in such poor health that they should not be working. Such individuals are never worth the salaries paid for a person in ill health can never handle the tasks which are part of his daily work. Not only are they a distinct loss on the firm's payroll but they may pass along their ailments to other employees and increase such losses even further.

Such a prehiring examination can also aid in placing people at the jobs for which they are mentally and physically adapted more easily; can detect remediable physical defects; determine the latent presence of serious organic diseases; prevent the spread within the staff of a hidden communicable disease, and increase

(*Please turn to page* 70)

Let's Talk Service



THE telephone industry has earned a reputation for unfailing and outstanding service. In the same tradition, Loomis, through more than twenty years of close association with the industry, has developed increasingly efficient methods of selling and servicing telephone directory advertising.

Loomis service starts with a factual appraisal of your directory's advertising revenue potential . . . and turns that potential into increased profits by effective selling. You are cordially invited to contact Loomis for the complete story of "service that sells."

Loomis ADVERTISING COMPANY

Gettle Bldg.
FT. WAYNE, INDIANA
KANSAS CITY, MO. ST. LOUIS, MO.
UPPER DARBY (PHILA.), PA. OMAHA, NEBR.

Get 60-SECOND Splices

STRONGER THAN THE LINE ITSELF

The NICOPRESS Way

1. CLEAN ends of wire . . . . . .
2. INSERT wire in sleeve . . . . . .
3. COMPRESS with Nicopress Tool . . . . .

Order Your Nicopress Tools and Sleeves of

AUTOMATIC ELECTRIC SALES CORPORATION

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MEREDUC

TRADE MARK

PRESSURE TREATMENTS of Southern Pine Poles, Crossarms, Conduit, Cover Plank, Ground Wire Moulding with No. 1 Creosote Oil or Pentachlorphenol are carried in stock permitting prompt shipments of carload and less than carload orders. Mailing address: P. O. Station "A", Atlanta, Ga.

WILLIAM C. MEREDITH COMPANY, Inc.

Treating Plant: East Point, Ga. — Mailing Address: P. O. Station "A", Atlanta, Ga.

TELEPHONE ENGINEER Handbook Tables

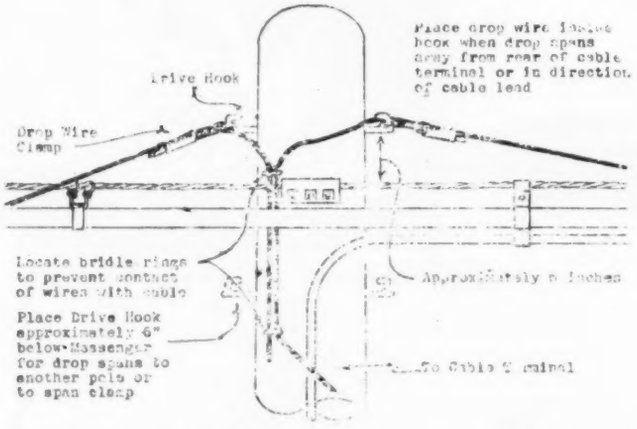
Index: Drop Wire Installation
Date: November 15, 1947

Subject: Methods of Attaching Drop Wire Spans on Pole or Cable Messenger

The following series of diagrams illustrate methods of attaching drop wire spans on a pole or on cable messenger.

Attaching Drop Span To Cable Terminal Pole

This arrangement is employed on a cable terminal pole that does not carry power wires. The drive hook may be attached elsewhere on the pole for clearing trees or other

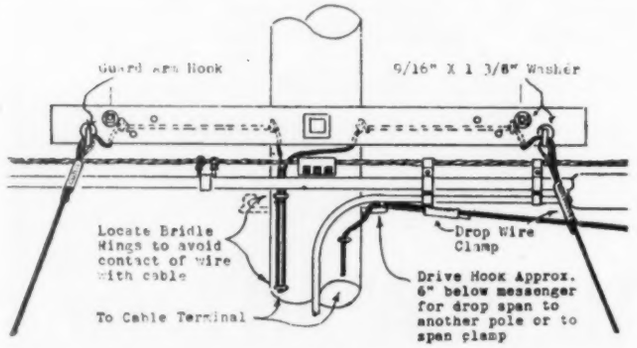

Place drop wire inside hook when drop spans away from rear of cable terminal or in direction of cable lead
Drive Hook
Drop Wire Clamp
Locate bridle rings to prevent contact of wires with cable
Approximately 6 inches
Place Drive Hook approximately 6" below Messenger for drop spans to another pole or to span clamp
To Cable Terminal

obstacles; provided that it does not interfere with climbing the stepped pole and that ground clearance requirements are met.

•

Attaching Drop Span to Cable Terminal Pole in Joint Construction

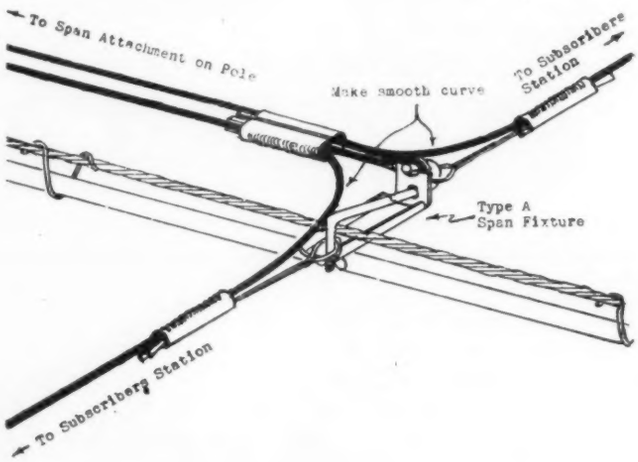
This arrangement is used when the cable terminal pole also carries power wires. Its purpose is to protect the power lineman from contact with the grounded cable


Guard arm Hook
9/16" X 1 3/8" Washer
Locate Bridle Wings to avoid contact of wire with cable
Drop Wire Clamp
Drive Hook Approx. 6" below messenger for drop span to another pole or to span clamp
To Cable Terminal

sheath and messenger and to provide climbing space through the telephone drops for the power man. The guard arm also assures more satisfactory distribution of the drops, especially when the drop load is heavy.

Attaching Drop Span to Ring Supported Cable

This method is employed to properly route drops around trees or other obstacles and to keep the span off any except the telephone subscriber's property. One span fixture will support two spans branching in opposite directions from

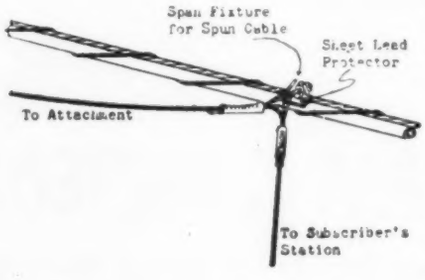


the cable as shown. Whenever this is possible, the slack wire between two clamps should cross under the cable rather than over to keep this part of the wire out of reach of squirrels.

•

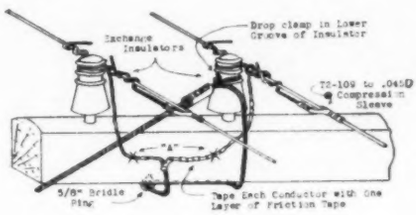
Attaching Drop Span to Spun Cable

The span fixture regularly used for ring supported cable cannot be satisfactorily attached to the messenger of a spun cable. The "B" span fixture shown is capable of supporting one or two spans. The sheet lead protector indicated is important to prevent chafing of the cable sheath by the fixture. The wing nut must be tightly set up to reduce the chance of the fixture loosening and falling off the messenger.



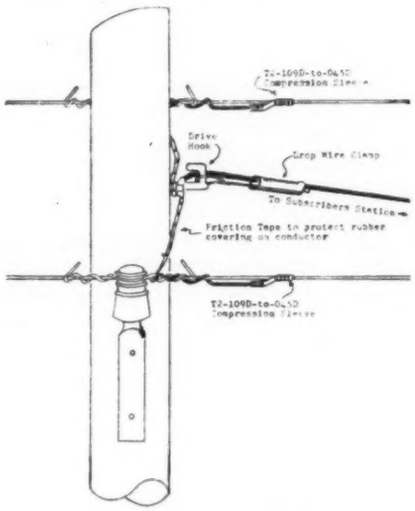
Attaching Drop Span to Double Groove Glass Insulator on Crossarm

The method illustrated is satisfactory when the glass insulators on an exchange lead crossarm are of the double groove type. The length of the drop wire between the clamp and the connection to the line wires is 36 inches. Eighteen inches of the outer braid is removed for the connection. The line wire is untied, the clamp slipped over the insulator, and the line wire then retied. The drop conductors are connected to the line wires by means of tap compression sleeves. Whenever the line is opened for tests, the drop conductors are cut at "A" and then reconnected with small compression sleeves. (If this is more satisfactory, a guard arm hook may be used for dead ending the span on the crossarm, rather than the double groove insulator.)


Exchange Insulators
Drop clamp in Lower Groove of Insulator
T2-109 to .045D Compression Sleeve
"A"
5/8" Bridle Pins
Tape Each Conductor with One Layer of Friction Tape

•

Attaching Drop Span to Pole in Bracket Leads

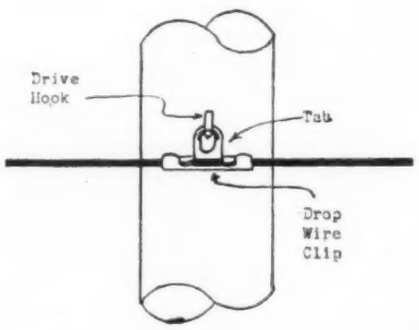


The drop span is dead ended on a drive hook fastened to the pole in the position indicated. The method of connecting the drop conductors to the line wires is the same as that employed for a drop span attached to a double groove insulator in crossarm leads.

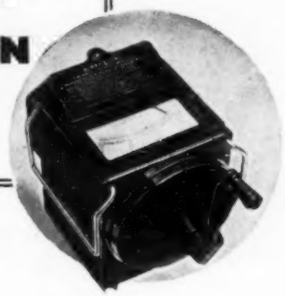
•

Attaching Drop Wire at Intermediate Points In Pole-to-Pole Runs

Drop wire clips are used for attaching drop wire to poles at intermediate points in a pole-to-pole run as shown. Before attaching the clips, the drop wire is strung over the drive hooks on the poles and then pulled to the proper sag. When an old style bracket and knob assembly is already in place, use a knob adapter to attach the clip to the knob.



"MEGGER"* INSULATION TESTER



*T. M. REG. U. S. PAT. OFF.

Whether in central office or out on the system, your "Megger" Insulation Tester is an unfailing detector of weakened insulation.

Simply turn the hand crank to generate 500 volts D.C. Read insulation resistance by pointer deflection. Always ready for use any time . . . anywhere . . . the new U. S. model in rugged plastic case weighs but 8 pounds. Telephone model has guard terminal and capacitance discharge switch. Write for Bulletin 1735-TE—today.

JAMES G. BIDDLE CO.
ELECTRICAL & SCIENTIFIC INSTRUMENTS
1316 ARCH STREET · PHILADELPHIA 7, PENNA.

INVEST YOUR "PIN MONEY" IN THE BEST

LOCUST PINS

Locust wood is practically impervious to decay and is impenetrable to moisture. Because of its close-grained hardness locust can be machined into strong, long lasting pins of standard specifications that can be counted on to retain their size and shape.

OAK BRACKETS

Oak pole brackets of unquestioned quality are in demand now as never before in the face of the qualifications necessary in the equipment and materials needed today to "keep 'em talking." Present day maintenance and repair have every reason to demand and get only the best.

GLASS INSULATORS

Research and experiment have produced in Hemingray insulators a glass insulator that is better than any ever before offered.

Non-porous, non-deteriorating, uniform coefficient of expansion and high mechanical as well as high dielectric strength are some of the many qualities that rank Hemingray the "best on the line."

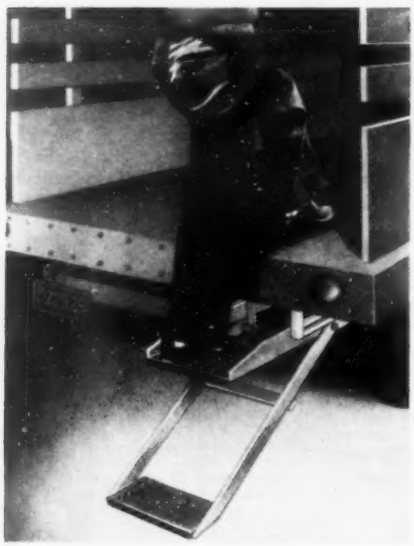
BUCKEYE TELEPHONE and SUPPLY CO.
COLUMBUS 6, OHIO

NEW PRODUCTS' SHOWCASE

Extendo Corp. Introduces No-Break Truck Step

The Extendo Corporation, now are manufacturing the new Extendo No Break Truck Step.

The outstanding feature of this step is that it will not break off should the



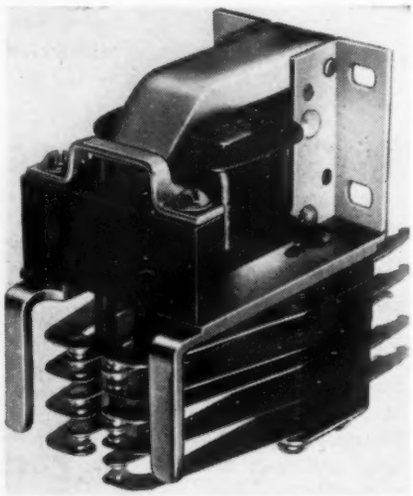
No-Break Truck Step

driver forget to retract it. The unit merely slides back into its frame or rack if the truck is backed up against a dock, wall or other obstacle. The step is attached to the truck by four bolts. For further information write New Products' Editor, Telephone Engineer Publications.

◆

Eastern Industries Develops Alternating Current Relay

An alternating current relay, developed by Automatic Signal Division, Eastern Industries, Inc., East Norwalk, Connecticut, to fill the need for a fast acting, reliable, compact relay for its vehicle-actuated traffic control systems, has been put on the market by the company.



Alternating Current Relay

The relay stands up in these traffic control systems under duty as high as 10,000,000 operations per year. A circuit closure of as little as .010 seconds operates the relay cleanly and as many as 10 individual pairs of contacts can be accommodated on each relay.

To meet the requirement of high insulation resistance—in excess of 300 megohms from any contact spring to any other spring or ground—even after long service, a method of individually encasing each contact spring in phenolic insulation was perfected. As a result, there is no continuous path along which current can creep inside the pileup.

Coils for 115 volts, 60 cycles, and 12 volts, 60 cycles, and pure silver contacts 5/32" diameter (rated 5 amps. 115V AC non-inductive) and 7/32" diameter (rated 10 amps, 115V AC non-inductive) are standard. Other contacts and coils can be supplied on special order.

Any combination of normally open, normally closed, break-make, make-before-break, or break-make-before-break, can be assembled in any relay.

◆

Miles Develops Induction Interceptor

The Miles Reproducer Co., Inc of 812-814 Broadway, New York 3, N. Y. has developed a midget "Telephone Induction Interceptor" known as the Miles "Telemike" which measures app. 1 inch square ¼ inch thick and weighs approximately 2 ounces.

Miles "Telemike" requires no physical contact to the telephone and picks up both sides of the telephone conversations for group loud speaker listening or for recording purposes.

Using Miles "Telemike" in conjunction with Miles Patented "Filmgraph Recorder-Reproducer" two-or multiple-way telephone recordings can be made on a thin safety film at a cost of five cents per hour. These recordings can be indexed and retained for permanent use at no extra cost.

Filmgraph Models "HM", "HK", "CMT" will start recording automatically and without any attention on the part of the user. An ingenius device-the Miles "Audio Self-Start-Stop Kontrol" is built-in the Filmgraph.

For complete information write New Products' Editor, Telephone Engineer Publications.

◆

Motorola Releases New Single Unit Dispatcher

D. E. Noble, vice president in charge of the Communications & Electronics Division of Motorola Inc., unveiled at the recent APCO convention in Los Angeles the new Motorola Dispatcher, featuring P.S.—"Precision" Selectivity, a revolutionary Motorola engineering development in low cost radio telephone equipment which permits conversations to be conducted without interference from common FM radiotelephone bugaboos.

The Dispatcher, designed for the 152-162 mc. band, is a compact single unit mobile radio telephone transmitter and receiver with a power output of seven to ten watts capable of covering a range of 15 miles or more, depending on conditions of terrain. Designed specifically for use in

The new Motorola FM radio telephone dispatcher unit installed in the trunk of an automobile. Note the chassis withdrawn to demonstrate ease of servicing, leaving ample room for luggage and tools.

noisy urban areas, this new Motorola radio telephone development permits conversations totally free from interference from other radio telephones or from sparking contacts of other electrical equipment such as lights, trolleys and ignitions. Spurious responses have been almost completely eliminated.

This compact noise-free communication instrument is the first radio telephone unit to incorporate "Precision" Selectivity, which provides absolute control during humidity and temperature changes which would normally shift the response curves or detune the signal. With P.S. the crystal drift is held to less than plus or -.002% over a temperature range of -20° to +80° centigrade.

In addition to the extreme technical advance in the design of the new Motorola Dispatcher, there are other convenient features. As a result of a drawer-type chassis, permitting easy access to the interior, the dispatcher is easy to service. Spare fuse holders have been built into the chassis. The transmitter and receiver are separate units mounted on the drawer support, each with its own chassis socket which makes for easy removal and service, interchange of units, or for independent metering.

A single control cable and a small conveniently mounted control head including microphone connector and hang-up switch have been specially designed for this unit, making it easy to install. A newly designed, single hole, roof-top antenna permits mounting without removing interior upholstery.

◆

New, Aluminum Trestle Ladder

The Aluminum Ladder Company, has developed a new aluminum trestle ladder for use in painting, cleaning, interior decorating, servicing outdoor signs, and similar work. Constructed of strong, lightweight aluminum alloy throughout, the trestle ladder may be used with others of its class to support stages and platforms, or it may be disassembled to form two separate units. The adjustable centerpiece ladder may be entirely removed for use as a straight single wall ladder, while the remaining part becomes an "A" type ladder capable of supporting a substantial weight.

The new, all-purpose aluminum trestle ladder is constructed of 61ST Aluminum Alloy, having a tensile strength of 45,000 lbs. per square inch. It is available in extended lengths of 10, 14, and 18 ft., the 18 ft. ladder weighing only 55 lbs.

The Aluminum Ladder Company also manufacturers aluminum trestle ladders to buyer's specifications. Complete information and prices will be supplied upon request to New Products' Editor, Telephone Engineer Publications.

◆

30,125 lb. Trailer-truck Fails To Break Plastic Flashlights

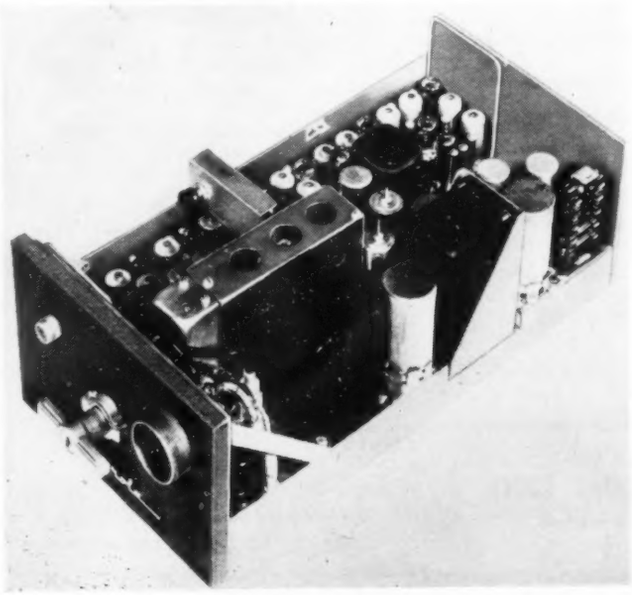
"Just how tough is a plastic flashlight" has long been a question and apparently also the basis of much speculation and many false rumors.

One plastic flashlight manufacturer, the Gits Moulding Corporation, Chicago, decided to do something about it and to prove the honor of their claims of manufacturing an unbreakable plastic flashlight.

"We decided to run a test on the durability of our Ethocel plastic flashlight production that would be so many times more severe than any test these flashlights would be put to in the hands of the consumer that there could be no further question as to 'just how tough a Gits plastic flashlight is'" states C. N. Cahill, sales manager of the Gits Corporation.

A trailer-truck, with a trailer weight of 7,800 lbs. and a tractor weight of 6,200 lbs. loaded with a 16,125 lb. shipment (totaling a gross weight of 30,125 lbs.) was used for this interesting and convincing test.

The results were hardly short of miraculous. Of the nine Gits flashlights used in this test (five with batteries and four without batteries) not one crack, or indication of the plastic case breaking, could be found. Those without batteries naturally flattened considerably more than those that were afforded the added advantage of interior support from the batteries, yet not one crack or sign of brittleness could be found. And a further observation was that each of the tested flashlights had returned most of the way to their original roundness within 24 hours after the test. This is due



View of new Motorola FM radio telephone dispatcher showing chassis withdrawn from case.

For more than 45 years the famous STEPHENS Climbers have been exclusively manufactured by

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of Binghamton

and in that time one objective has been constantly kept in mind—to maintain the same high quality standards established by Wilmot Stephens when he first forged climbers on a blacksmith's anvil almost a half century ago.

Extreme care is taken to provide safe, comfortable equipment, and every article is inspected to comply with the exacting requirements established by safety engineers.

Buckingham "Cushion Deluxe" Floating Tool Belt No. 58 is made from the best latigo and chrome leathers. It has the "rolled edge" feature that gives a cushion effect with the greatest comfort to the wearer. Rigidly tested for strength and safety.

Here's Why Buckingham Climbers are Safer — More Comfortable!

- Shank a perfect fit, shaped for comfort.
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- Round loop will not cut straps.
- Gaff is hammer-forged from special tool steel, set straight with body of climber and close to foot-piece, giving least strain to climber, and maximum comfort to lineman.
- Each climber tested for toughness and strength of gaff rivet.
- Each climber Parkerized (rust proofed) and lacquered.

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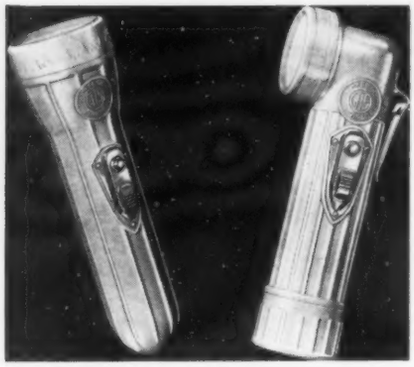


Gits Plastic Flashlights

to the molecular tension built up in the molding process under very extreme pressure.

The Gits plastic flashlights are molded of "LT" Ethocel, a Dow Chemical Company war development that was used for army canteens and many other similar individual equipment as well as the Gits 122 right angle flashlight that had to stand unbelievable conditions of temperature, humidity, and extremely dry climates. The Gits Ethocel Plastic case is also nonconductive and therefore offers an added safety feature when used near electric wires.

◆

Speed Way 69 Electric Drill

The Speed Way No. 69, ¼" Electric Drill, manufactured by the Speedway Manufacturing Co., has proven exceptionally popular in the field.

This light duty utility tool will perform ideally at its rated capacity; free speed 1,000 r.p.m; normal load speed

Speed-Way 69 Electric Drill

600 r.p.m; 110-120 volt AC-DC motor. Unit weighs only 2¼ lbs, and has a special high torque universal Speedway drill motor. For complete information write New Products' Editor, Telephone Engineer Publications.

◆

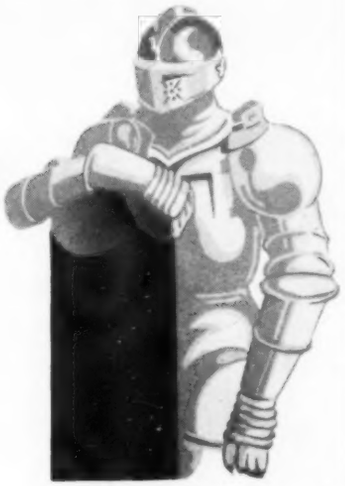
New Ten-Staple Strips For Low-Voltage Wiring

The Superior Manufacturing Co., Fitchburg, Mass. has introduced a new, handy, inexpensive idea for electricians making low-voltage or tele-

"Black Beauty" Poles

...are armored for longer service

Deep, penetrating charges of top-grade creosote serve to armor-plate these tough, long-wearing "Black Beauty" poles against every form of nature's attacks. "Black Beauty" poles are processed by the patented "empty cell" method which draws out excess moisture and then fills each cell with preservatives. Specify "Black Beauty" when you order poles.



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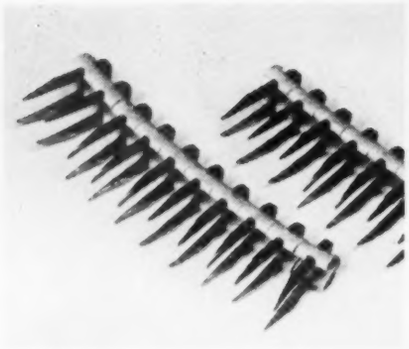

Insulated staples drive easily, grip firmly.

phone wiring installations. The company's patented insulated staples, packaged in strips of 10, are designed for easy and rapid handling. The insulated staples drive easily, grip firmly and come in colors to match interiors. Graybar is handling distribution in over 90 cities. The manufacturer states the staples are patented, meet government specifications for low-voltage wiring.

◆

J. N. Johnson Forms Tree Expert Company

Announcement was recently made of the formation of the J. N. Johnson & Company, Tree Experts, Ashland, Ky. The new company is headed by J. N. Johnson as president and general manager; Louis Cox, Frankfort, vice-president, and Henderson Dysard, Ashland, secretary and counsel.

The new compnay will serve a wide area including Kentucky and neighbor-

J. N. Johnson

ing states, rendering expert tree service for electrical power and telephone companies and other clients.

E. H. Williams, Portsmouth, O., is production manager, and will supervise the firm's activities in the field. Both Mr. Johnson and Mr. Williams have long been identified with both the utility and tree expert businesses.

The company will emphasize quality workmanship in maintaining and preserving adequate tree attention. It was also stated by Mr. Johnson that trained dendricians are employed, who will be under the constant supervision of a competent arborist long established in the tree industry.

According to Mr. Johnson, the new company is equipped to perform all types of expert tree work, both private and larger contract projects. While electric and telephone line clearance work will predominate in the activities of the company, it was pointed out that tree preservation is a major objective of the company.

Mr. Johnson recently withdrew from the F. A. Bartlett Tree Expert Company of Stamford, Conn. He was midwestern divisional manager with division headquarters in Ashland. The new firm's business address is 1120 Second National Bank Building, Ashland, Kentucky.

◆

Leonard Stewart Joins American Coach & Body

Officials of the American Coach & Body Company, Cleveland, Ohio, have announced the appointment of Leonard A. Stewart to the position of chief Engineer. He is a graduate of General Motors Institute of Technology. For the previous 8 years Mr. Stewart was affiliated with Mack Trucks, Inc. in the capacity of body engineer of the truck division. Prior to that he was body engineer of Diamond T Motor Car Company, Chicago.

Mr. Stewart has spent 21 years in the automotive design and engineering field, and has held positions of responsibility in eight firms including; International Harvester Co., Stanley Steam Motor Corp., Fisher Body Corp., Cadillac Motor Car Co., and Gardner Motor Car Co. He brings his experience including shop, product design, cost reduction, and departmental organization to The American Coach & Body Company.

Mr. Stewart serves The Society of Automotive Engineers on three committees; Body Standards, Body Activity, and Membership Committees, and is chairman of the sub-committee on Standardization of Mouldings and Clips. He is a charter member of the American Society of Body Engineers.

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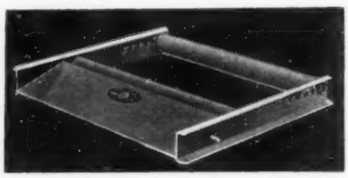

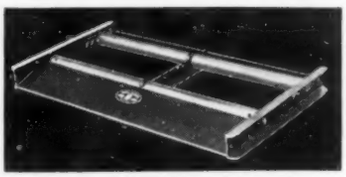

STYLE A (top) Width 30″; Depth 28″; Height 3½″. Weight, 50 lbs. Capacity, 2000 lbs. Supports up to one 28″ wide reel.

STYLE B (below) Width 52″; Depth 28″; Height 4″. Weight, 110 lbs. Capacity 4000 lbs. Supports two 24″ wide reels or up to one 48″ wide reel.

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- Ball-bearing rollers are at same level, so that cable can be safely taken from front or back, top or bottom.
- Amazingly low cost.

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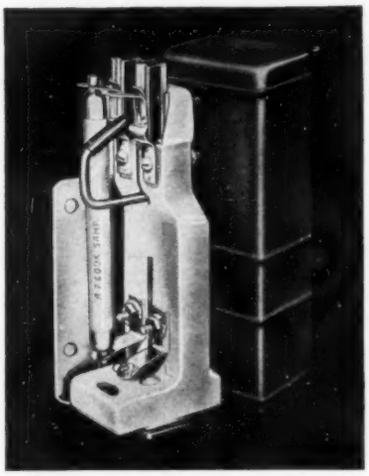

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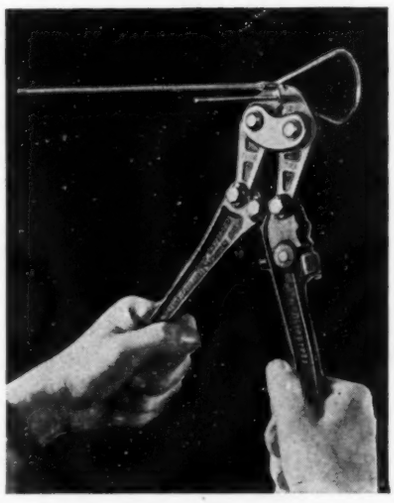
Nicopress Dead Ends make possible a tail of any desired length.

These Nicopress tools are small and compact—can be operated with no trouble at all close to insulators or cross arms.



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Roundtable LINE and DESK Discussions

Edited By
J. S. REED, JR.

Q. In converting a grounded line to metallic, would it be all right for us to just string the new wire with the old wire?

A. We do not recommend that you string new wire along with the existing wire. It would be better to take down the old wire and string two new wires to make a metallicized line, particularly if you have to transpose the line to reduce noise induction from a paralleling power line, or the old wire is quite old and has many splices in it. If the old wire is found to be still serviceable, it may be reused in another section of the line where it can be paired with existing wire in approximately the same condition. Rusty wire or wire with poor galvanizing obviously should never be reused.

◆

Q. We have decided to use cable dessicant in splicing our cable. Would this have any effect on the size of lead sleeves used to cover the splices?

A. When cable dessicant is utilized to dry out cable after splicing, it is necessary to leave the granules of dessicant inside the splice. This makes the splice somewhat larger, so a larger diameter sleeve is usually required. In general, for branch cables from 15 pr. to 50 pr. spliced to a main cable of from 25 to 150 pr. size, the sleeve would have to be ¼ inch larger in diameter than the standard sleeve. For larger cables, the sleeve would have to be about ½ inch larger in diameter. Experience will soon indicate the proper size of lead sleeve to use in most cases.

◆

Q. What is the procedure for ground bracing a corner pole that cannot be guyed in the conventional manner?

A. To ground brace a corner pole that cannot be guyed, the method illustrated in Figure No. 1 may be used. It is not necessary to bolt the logs to the pole. It is important that the pole be one size larger than other poles in the line, as having no guy to support it, it is subject to rather considerable stress in this location.

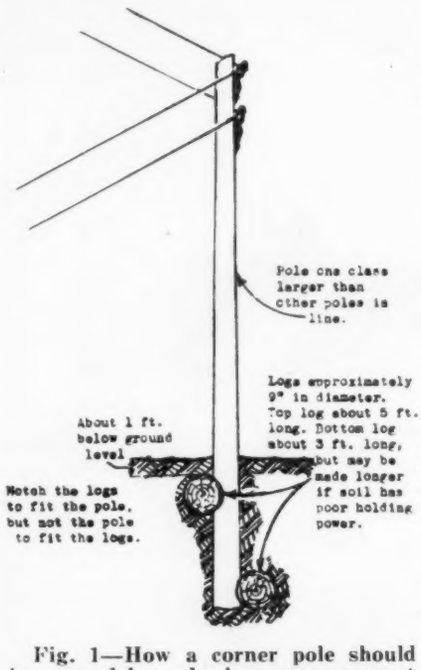

Pole one class larger than other poles in line.
Logs approximately 9" in diameter. Top log about 5 ft. long. Bottom log about 3 ft. long, but may be made longer if soil has poor holding power.
About 1 ft. below ground level
Notch the logs to fit the pole, but not the pole to fit the logs.

Fig. 1—How a corner pole should be ground braced when a guy cannot be used.

◆

Q. After recently converting our magneto exchange to dial operation, our cable gave us considerable trouble. Before this conversation we had satisfactory service from it. What could be causing so many cases of trouble practically at once?

A. Exchange cable usually have weak spots, due to moisture or burned insulation from lightning strokes or power crosses sometime in the past. Such defects may not affect service on magneto lines to agreat degree and thus may not be detected. When the exchange is converted to dial or common battery operation, however, the voltage of the central office battery soon breaks down the insulation at the weak places. The higher ringing voltages, especially in harmonic ringing systems, is also a factor in causing the breakdowns. It is advisable to check the condition of exchange cable before making the conversion, and replace defective sections where found. This can be done by applying the common battery and ringing current to each cable pair during tests prior to cutting over to the new system.

◆

Q. What amount of variation in spacing between poles is considered permissible?

A. The maximum variation considered permissible for spacing between poles is 20 per cent under and 10 per cent over normal spacing for rural and toll voice-frequency lines under construction. Thus for a normal spacing of 210 feet (25 poles per mile), the minimum spacing may be 168 feet and the maximum, 231 feet. In the case of carrier lines, it is advisable to maintain as nearly as normal spacing as possible. This is due to the fact that transposition points occur more frequently in such lines and these points must be located as accurately as possible in accordance with the transposition scheme.

Free Help on Problems

IF YOU DON'T see a ready answer to your questions, let TELEPHONE ENGINEER'S staff of technical men tackle it for you. This is a free service. Your question and the resulting answer may not only solve your problem but help the many other telephone men reading these columns. Jot your questions on a postcard and look to LINE and DESK for reply.

Rural Line Maintenance

(Continued from page 30)

bring it over to a pole where it can be taken off.

A broken branch that is tangled with the wires may be cut up with a tree trimmer, taking care not to cut the wires in the process. The pieces may then be pulled off the wires with the trimmer.

To prevent a repetition of the trouble, all such debris, as well as pieces of wire or other objects found on the ground in the vicinity, should be picked up and taken away.

Conclusion

THE MAINTENANCE of rural dial lines is more important than in the case of magneto lines, particularly when trunk lines from one dial exchange to another are involved. Trees and weeds must be kept away from contact with such lines, as the operation of the switching equipment is easily affected by line leakage. For this reason, the annual check-up and repair of lines should be supplemented by a program in which maintenance men dispatched on trouble cases are given the responsibility of inspecting lines as they drive by and stopping to make any needed repairs that can be handled on the spot. When consistently followed, this program will keep telephone service on these lines at a high level and assure subscriber satisfaction.—THE END.

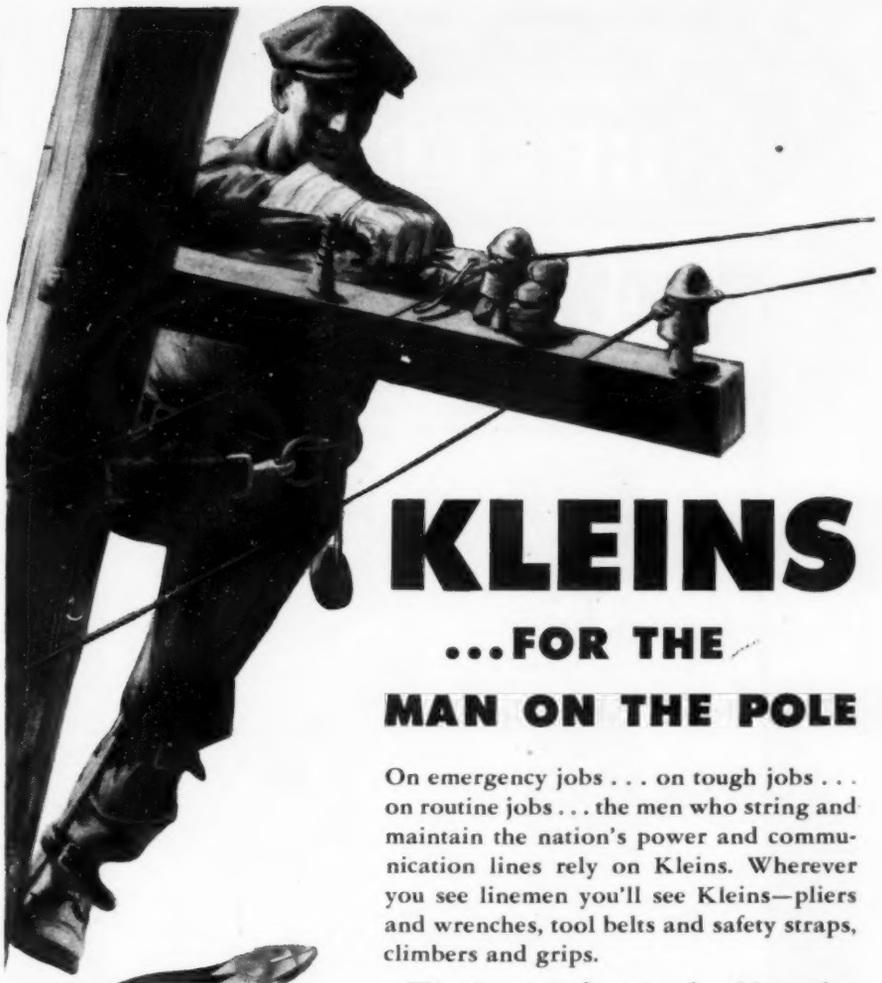
Coming Conventions

Missouri Telephone Association, Governor Hotel, Jefferson City, November 17 and 18.

North Carolina Independent Telephone Association, Pine Needles Hotel, Southern Pines, November 20 and 21.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, December 4 and 5.

(Plan Now to Attend Your Associations's ANNUAL CONVENTION.)



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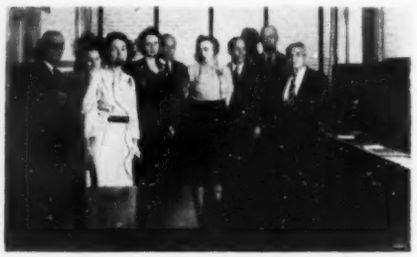
Automatic Service for Plattsmouth, Nebraska

The Lincoln (Neb.) Telephone & Telegraph Company on October 23 completed the conversion of its Plattsmouth exchange to automatic operation. Plattsmouth is the 43rd exchange



A portion of the new 4-position toll board. C. C. Donley, general traffic supt. is 3rd from right; Fred Davis, Automatic Electric Co., is 5th from right.

operated by the company to receive automatic service and is the 13th exchange to be converted since the end of the war. The company operates a total of 120 exchanges in Southeastern Nebraska.

Prior to the conversion, extensive improvements and additions were made in outside plant facilities and a modern brick exchange building was erected. The total cost of the project was $165,000.00. The Plattsmouth exchange serves 1,524 subscribers and is the company's second largest dial operated exchange.

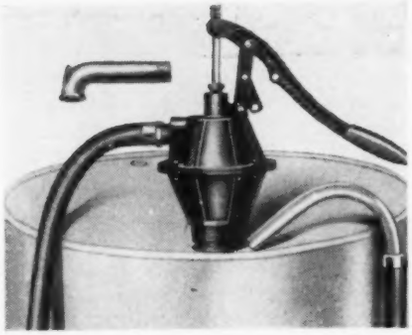
A group of company officials and prominent citizens at Plattsmouth were present at the cutover ceremony which took place at 10:00 P.M. John Schreiner, president of the Plattsmouth Chamber of Commerce, had the honor of giving the signal for the cutover and the first long distance call was placed from Mayor Clement Woster to John H. Agee, vice President and general manager of the company at Lincoln. T. H. Pollock, a prominent pioneer in Independent Telephone Activities in Nebraska and particularly at Plattsmouth, was given the honor of placing the first local call over the new dial system.

The Lincoln company's program of automatic conversions is moving steadily forward and work is now in progress on several additional exchanges.

◆

General Scientific Introduces New Drum Pump

Utilizing the diaphragm principle, a new hand pump supplied by General Scientific Equipment Company, is claimed to be the last word in pump



New drum pump utilizes diaphragm principle.

efficiency and sturdiness. It is being increasingly used to remove liquids such as alcohol, kerosene, gasoline motor oils, crude of fuel oil, anti-freeze, paint thinners, water and sprays from drums and barrels.

Fast pumping (fifteen gallons of light oil per minute), it requires no priming, has no leather or rotating parts to wear out, gives long, trouble-free service. Pump screws directly into drum and no separate bung bushings are required for 1½ or 2" drum openings. Waste is eliminated as a lift of the handle allows liquid to drain into drum and an automatic seal prevents evaporation. It is ideal for drums of 15 to 60 gallons capacity.

This new all-purpose drum pump is providing dependable, trouble-free service in production and maintenance throughout industry, for railroads and other public utilities and in garages. For descriptive literature write New Products' Editor, Telephone Engineer Publications.

◆

Rockford Paint Company Releases Valuable Booklet

The Rockford Paint Mfg. Co., Market & Madison Streets, Rockford, Illinois, has just announced the completion of a four-page, four-color descriptive folder on Rockcote Zinc Chromate.

Titled "Greater Protection for Structural Steel", this informative folder points the way to reducing costly replacements of steel telephone and telegraph poles that have become useless due to the formation of rust and corrosion.

Another distinctive feature of this new Rockcote folder is the unique way it is printed with inks matching the three colors of Rockcote Zinc Chromate, ie, red, green, and yellow (the natural zinc chromate color).

This valuable piece of literature highlighting application of wartime-developed rust-inhibitive coating on telephone and telegraph poles may be obtained direct from New Products' Editor, Telephone Engineer Publications.

Crapo
Galvanized Steel
CABLE LASHING WIRE

Widespread adoption of the "spinning" method of cable suspension has brought increased demands for a superior and consistently dependable lashing wire.

Crapo Galvanized Steel Lashing Wire (.091 inch diameter) has been developed specially to fill these demands. It is manufactured from selected steel, is carefully processed and is given a heavy zinc coating for longer life. The finished wire conforms, in every respect, to the exacting specifications of leading telephone engineers—for ductility, tensile strength, torsion and galvanizing.

Crapo Galvanized Steel Lashing Wire is put up in neat, compact, thread-lay coils for ease in handling. For use in modern cable-spinning machines. Packed in cartons containing 6 coils, each coil containing approximately 325 feet of wire.

☆

"STAINLESS STEEL"

Crapo Cable Lashing Wire also can be supplied in "Stainless Steel" (.065 and .045 inch diameter). Complete details will be forwarded upon request.

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INDIANA STEEL & WIRE COMPANY · MUNCIE, INDIANA

The Adler Short Haul Carrier

(Continued from page 36)

supply and 70 volts D.C. as a relay supply. In addition, 6.3 volts A.C. is required for a vacum tube cathode heater supply. These voltages are supplied by power supply equipment mounted on a separate panel. This panel is suitable for mounting on the standard 19" panel and requires 5" of vertical rack space. The source of energy for this unit is the commercial 115 volt or 220 volt A.C. station supply. Figures 5 and 6 respectively show the power supply equipment assembled on a panel suitable for mounting and the schematic wiring diagram of the unit.

Capacity of the power supply is adequate to furnish power for two terminal equipments. This means that if a two-channel system (four terminals) is installed, only one power supply is required at each end of the carrier circuit to operate the two associated equipments. If a single channel is initially installed, the second channel may be added later without the necessity of purchasing additional power supply units.

A source of 20 cycle power of at least 70 volts is required for operation of the signaling circuits when a channel is operated on a ringdown basis. It is assumed that this supply will be within commercial limits.

In some instances it may be desirable to provide for emergency equipment, operating from the station batteries in the event of A.C. power failure. Such equipment is available together with controls to automatically transfer the power source.

Auxiliary Line Equipment

TO OBTAIN the best operation of a carrier system over any given line it may be necessary to install one or more auxiliary devices and by so doing, properly "carrier-equip" the line. Whether or not such devices are necessary in a particular case can be determined only by making a study of the circuit to be used as the carrier transmitting medium. The principal purpose of these devices is to improve, at carrier frequencies the efficiency of the carrier transmission. At the same time, the quality of the voice-frequency transmission must not be impaired.

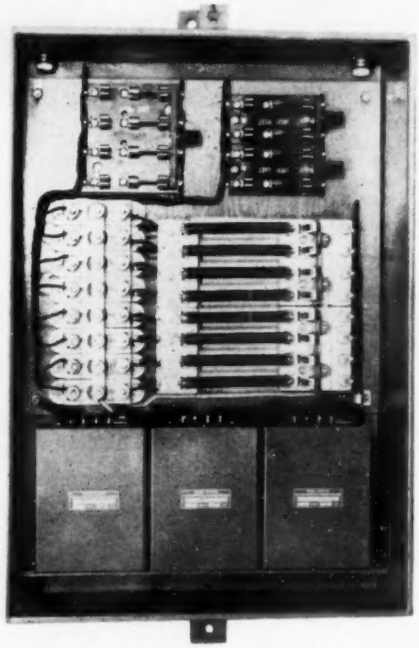

Fig. 10—Type 2-A transfer filter set.

The Type 310-D auto-transformer (Figure 7) is provided to correct the impedance mismatch occurring between two unlike section of lines such as open-wire to cable, open-wire copper to open-wire copper-weld or iron. It may also be used to match any type of cable or line to other transmission equipment of fixed impedance. Each unit provides for impedance ratios of 1:1, 1:1.5, 1:2, and 1:3, and 1:4.

The Type D-204 balance coil has been designed to maintain the balance of the phantom circuit when a carrier channel is installed on one side-circuit of a phantom group. Application of carrier equipment results in an increase of the associated side-circuit impedance due to the insertion of the 3 KC low-pass filter. Insertion of the Type D-204 balance coil on the other side-circuit functions to rebalance the two side-circuit impedances.

The Type 115-G blocking coil is available for use in preventing carrier energy from being absorbed by any existing bridged telephone sets. These units are connected in series with one lead of the set and present a high impedance to carrier energy. Standard telephone test sets should be equipped with blocking coils if they are to be used to check operation on a voice-frequency circuit over which carrier equipment is operating.

The Type 1B side-line filter is provided for connection between the main carrier line and existing side-lines or branch circuits. If a branch circuit is connected to the main line over which carrier energy is transmitted, serious system disturbances will occur due to the resulting impedance mismatch at carrier frequencies. The installation of the Type 1B filter will materially reduce the reflection losses due to the branch circuit. In the case of longer branches or local conditions that are largely unpredictable, it may be necessary to install complete transfer filter sets. The Type 1B side-line filter is also available mounted in a weatherproof metal pole-box, complete with protectors and by-pass switches (Figure 8).

The Type 2A transfer filter sets (Figure 9) are available for use when it is necessary to have access to the voice-frequency conversation without interfering with the carrier energy. An example of this would be a station where the physical is terminated but it is desired to by-pass the carrier circuit around the station and beyond over another physical pair. The Type 2A transfer filter sets are also available mounted in a weatherproof metal pole-box complete with protectors and by-pass switches (Figure 10).

The Type 200 AF repeating coils are designed to pass all frequencies from 20 cycles to 28.4 kilocycles. Their application is required when it is desirable to couple the carrier energy on the station side of the repeating coils. Standard repeating coils will not necessarily pass the carrier frequencies. In many instances, the carrier energy may be coupled to the line on the line-side of the existing repeating coils and the special units will not be necessary. The Type 200 AF repeating coil is a multi-purpose simplex and phantom coil having 1:1 or 1:2 ratio connections. Both line and drop sides are balances for simplex.

The Type D-123 insulating transformers (Figure 11) are available for use where there is the possibility of power lines coming in contact with the telephone circuit. The transformers are mounted in an oil-filled tank, designed for pole-mounting. Windings are tested to withstand a potential of 25000 volts between windings and from windings to case. The insertion loss of these units is

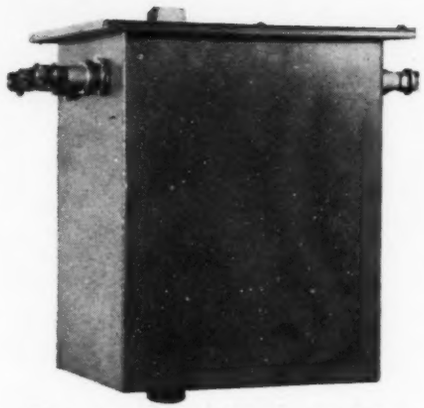

Fig. 11—Type D-123 insulating transformer.

from 0.3 db at 20 cycles to 3.5 db at 28.5 kilocycles. If a carrier circuit is installed, existing insulating transformers not designed to pass carrier frequencies must be replaced by units capable of operating at the higher frequencies as well as in the voice-frequency range.

The characteristics of the lines over which carrier systems are designed to operate are important if the best a system has to offer is to be realized. In order to successfully plan a satisfactory carrier system installation it is necessary to have complete information relative to the system over which the carrier channels are to be operated.

Following are indicated some of the more important items to be given consideration:

(1) Type of circuit.
(2) Length of Open-wire circuit.
(3) Spacing, gauge and type of conductors.
(4) Length and gauge of cable sections.
(5) Loading details of cable sections.
(6) Transposition layout.
(7) Complete information relative to all voice-frequency facilities operated over the circuit or group on which the carrier system is proposed. This information should include: (a) Location of all bridged telephone sets, (b) Length and location of all branch lines, (c) Location of existing voice repeaters, and (d) Type and location of all simplex, or phantom repeat coils, insulation transformers, etc.
(8) Location of 115 volt A.C. power in the event carrier repeaters are required.
(9) Data relative to exposure to power lines.
(10) Complete information regarding any other carrier systems in close proximity or on the same pole line that are now operating or are planned future operation.

The Adler Type SD short-haul carrier telephone equipment will provide a rapid means of adding additional talking circuits as the traffic demands. Initial equipment costs are relatively low. In the majority of cases, the installation of Type SD equipment has proved to be the most economical means of providing additional talking circuits over existing wire facilities. Maintenance and operating costs are extremely low. Adequate safety factor is provided for all components designed into the system, thus providing for long and trouble-free service.—THE END

◆

Copperweld Plant Holds Open House

During its Open House Day, Thursday, October 16, the Copperweld Steel Company of Glassport, Pa., was host to about 8,000 visitors.

The unique manufacturing processes involved in the making of Copperweld products attracted the attention of veteran steel men as well as the friends and families of Copperweld's employees. Of particular interest were the casting and rolling operations. In the casting department, molten-copper is poured around a heated alloy steel billet inside a graphite mold to form the Copperweld ingot. This ingot is then started through the rolling mill and reduced from about 8 inches in diameter to a rod of about 3/8 of an inch in diameter.

Cold drawing through tungsten carbide dies reduces the rod to wire for telephone, telegraph and signal lines as well as for many other uses. Another important application is for grounding. Here, Copperweld ground rods provide lightning protection for billions of dollars worth of property and equipment. By combining a number of Copperweld

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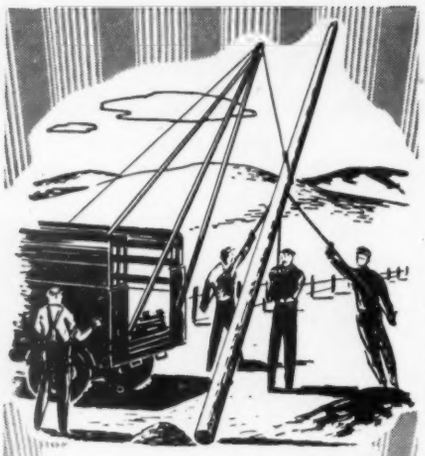

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wires or a combination of Copperweld and copper wires, various types of strand and conductors are produced for guying poles and structures, for supporting aerial cables, for power transmission and distribution, and for railway signal bonds. These are but a few of the many uses for Copperweld products.

The molten-welding of a copper exterior to a high-strength alloy steel core is an exclusive Copperweld process—being found nowhere else in the world.

Copperweld's faith in the community and the future is evident by the presence of new equipment and improvements involving a recent expenditure of one and a half million dollars. Plans call for even greater improvements and expansion to be made in the future.

◆

100-Pound Strength Tester Announced by Dillon

W. C. Dillon & Company have announced the new Dillon 100 lb. Universal Tester that handles specimens in tensile and in compression.

The manufacturer states this instrument is unusual because it is so compact, light weight and accurate.

The following pertinent specifications apply: Capacity, 100 lbs., x 1 lb. increments; accuracy, 2% of indicated load; dial, 5" O.D.; length, 15" including handwheel; width, 5" across dial, 2-⅜" across body; height, 3-⅛"; weight, 3-¼ lbs.; power, hand operated; stroke, 3" (1" min. and 4" max. daylight opening); grip face, ¾"x1¾", non-serrated; mounting, either permanent or portable, and finish, polished aluminum and gray crackle.

This tester can be hand-held for operation. It cannot be injured by accidental overload or shock recoil. It will handle tensile specimens 1-¾" wide x ⅛" thick; will test rope, string, cord, fibres, wire specimens up to ⅛" dia. In compression, will handle steel, aluminum, brass, fibre-board, plastics, cloth and wood adhesives, etc. Has long-life brass bushings at all moving points.

◆

Clough-Brengle Transmission Measuring Set, Model 217-H

The Model 217-H Transmission Measuring Set is designed for both field and laboratory use, all needed components for transmission testing being combined into one simplified "package". Circuit as well as physical construction have been worked out to cut testing time to an absolute minimum without sacrificing true "laboratory" accuracy.

The Model 217-H thus replaces the cumbersome aggregation of pads, meters and other accessories formerly necessary to the solution of design and maintenance problems. All necessary elements plus convenient switching facilities enable all desired transmitting and receiving levels to be established and accommodated simply and easily.

A complete data sheet covering the Model 217-H will be sent upon request by the manufacturer, Clough Brengle Company, 6016 Broadway, Chicago 40, Illinois.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of March 3, 1933,

of Telephone Engineer and Management, published monthly at Pontiac, Illinois, for October 1, 1947.

State of Illinois, County of Cook, ss.—Before me, a notary public in and for the State and county aforesaid, personally appeared Ray W. Smith, who, having been duly sworn according to law, deposes and says that he is the editor of the Telephone Engineer and Management, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addreses of the publisher, editor, managing editor, and business managers are:

Publisher—Telephone Engineer Publishing Corp., 7720 Sheridan Road, Chicago, Illinois.

Editor—Ray W. Smith, 7720 Sheridan Road, Chicago, Illinois.

Business Managers—Ray W. Smith & Roy F. Smith, 7720 Sheridan Road, Chicago, Illinois.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address as well as those of each individual member must be given.)

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3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.)

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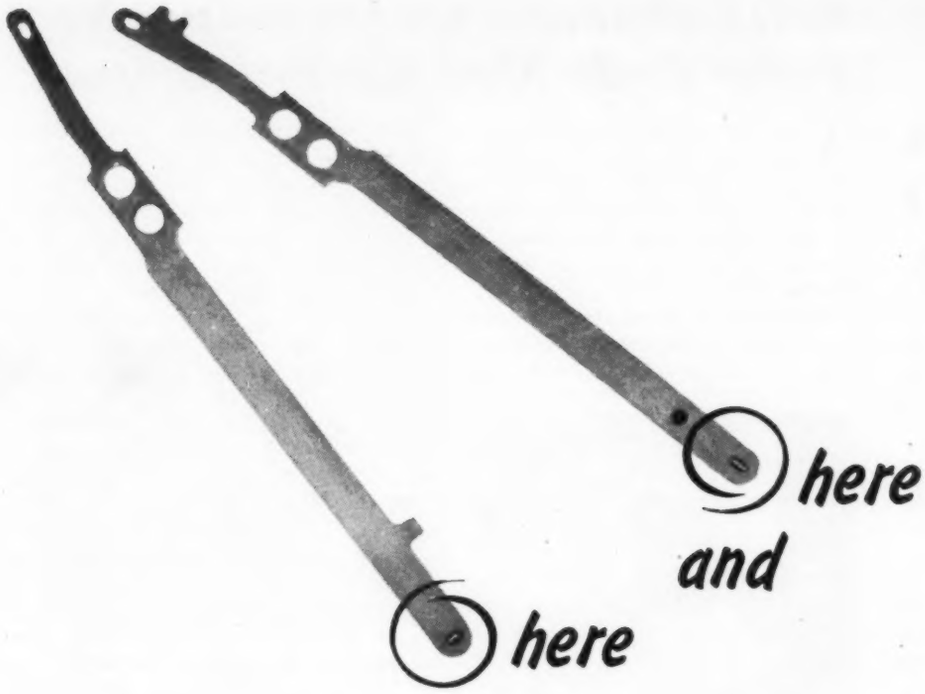
4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

RAY W. SMITH,
Editor.

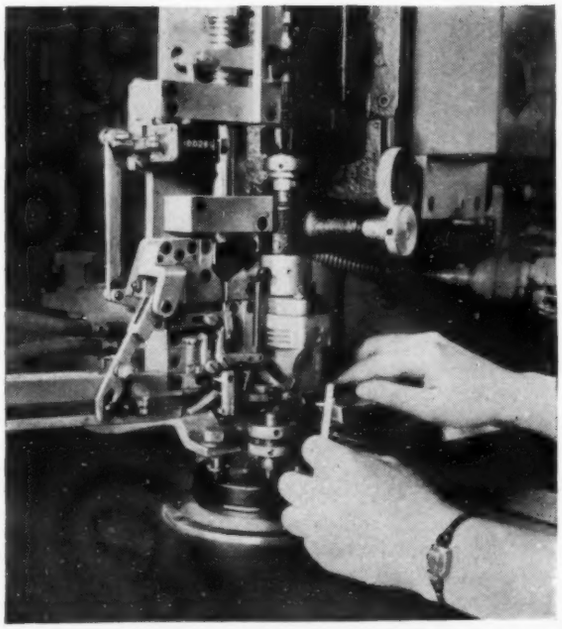
Sworn to and subscribed before me this 1st day of October, 1947.

(My commission expires Dec. 4, 1948.)

(Seal) RUTH LOWERY,
Notary Public.



How to put precious metals on the spot ...and save millions!



1300 times an hour this precision machine snips a tiny precious metal contact from a spool of bi-metal tape and welds it accurately in position on a relay spring.

Platinum rivets the size of a pinhead formerly were used for contacts in telephone relays. They were good, but — needed by the billions—they were costly.

Bell Telephone Laboratories explored the possibilities of using other precious metals and alloys, and developed a bi-metal tape — 85% nickel and 15% palladium — that worked as well as, or better than platinum.

At Western Electric — manufacturing member of the Bell Telephone team — engineers designed machines to weld the nickel and palladium wires together, roll them into a tape, snip off tiny contacts and weld them to exactly the right spots.

The introduction of bi-metal tape and the development of electronically controlled machines to make and apply it, have made possible the production of well over a billion metal contacts a year and resulted in considerable savings.

This is typical of the never-ending teamwork by Bell Telephone Laboratories and Western Electric in finding ways to make more *and better* telephone equipment at lower cost.

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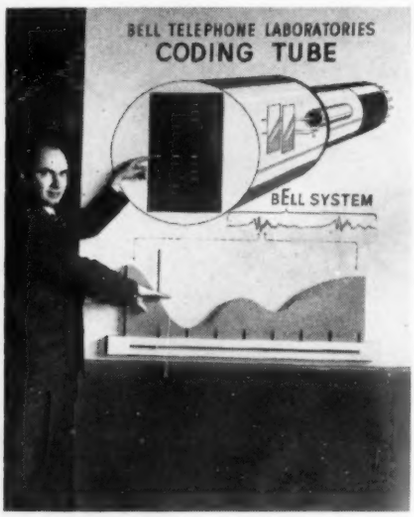
Bell Laboratories Introduce New Pulse Code Modulation System

A RADICALLY new communications technique for long-distance telephone transmission recently was given its first public demonstration by engineers of Bell Telephone Laboratories where the new art is under development.

Known as PCM, an abbreviation for pulse code modulation, the new technique is entirely different from earlier forms of pulse modulation and promises marked freedom from noise and interference.



A radically new communications technique for long-distance telephone transmission recently was given its first public demonstration by engineers of Bell Telephone Laboratories where the new art is under development. Known as PCM, an abbreviation for pulse code modulation, the new technique is entirely different from earlier forms of pulse modulation. Explaining a new type vacuum tube used in the system is L. A. Meacham who has been active in the development work.

A special demonstration program illustrating the remarkably clear transmission which the new system affords was brought over telephone lines from the Bell Telephone Laboratories research buildings at Murray Hill, New Jersey, where the equipment is installed, to the auditorium of the Engineering Societies Building, 29 West 39th Street, New York City.

There, at a meeting of the New York Section of the Institute of Radio Engineers, several hundred engineers heard the program and an explanation of the new technique. Both speech and music were sent over the new system and reproduced through loudspeakers in the auditorium.

The new technique is expected to find use on broadband transmission hook-ups, including microwave radio relay systems, such as that now being installed to link New York and Boston. Basically it is a method of transmitting the human voice by various patterns or codes of electrical impulses.

A revolutionary new vacuum tube which electronically converts the human voice into these patterns or codes was also displayed for the first time at the meeting. In a 96-channel laboratory model now under development, such Bell Laboratories tubes will handle code signals at the incredible speed of 5,376,000 pulses per second.

Although the new system is expected to be used primarily as an adjunct to the telephone network, it can also be used to transmit radio programs, pictures, and teletypewriter signals.

The demonstration was given by L. A. Meacham and Eugene Peterson of the technical staff of Bell Telephone Laboratories, both of whom have been active in the development of the system. The coding tube was described by R. W. Sears, also of the Laboratories staff, who designed and developed it for use in the system.

The new technique overcomes one of the difficulties of long-distance radio systems, namely, the building up of noise with each of the many amplifications needed for a long-distance radio hook-up. With PCM, an entirely new approach to the problem is provided by the use of special amplifiers in which the signal code is reconstructed during each amlification. Thus, no matter how many amplifiers are used, the PCM signal is received with its original quality.

Use On Broad-Band Communication Systems

PULSE MODULATION, or sampling, transmission in general is expected to be used on broadband communications systems on which many conversations can be carried simultaneously. Such transmission is so named because the continuous speech wave is sampled very briefly and rapidly and only information regarding these samples is transmitted. For a standard telephone circuit 3000 to 4000 cycles in width, samples taken at the rate of 8000 per second are adequate. Just these brief samples are sufficient to reconstruct the original wave.

Since information regarding the sample can be sent very quickly—in roughly a millionth of a second—the system can carry not just one but many

This revolutionary new vacuum tube, developed by engineers of Bell Telephone Laboratories, recently was revealed in connection with the first public demonstration of a new communications technique for long-distance telephone transmission which has been developed by the Laboratories. Holding the tube is R. W. Sears who developed it.

different telephone conversations, each of which is sampled in turn and then reassembled at the receiving end. Thus, a transmission system of this type actually carries a sample from one conversation, then from another and so forth, repeating the sampling cycle through as many conversations as are being transmitted.

Several pulse methods have been available by which information regarding the sample can be transmitted. One method, known as PAM for pulse amplitude modulation, sends a sample amplitude directly. Another, known as PPM for pulse position modulation (and also as PTM for pulse time modulation), varies the time with respect to a reference time at which pulses of uniform amplitude and duration are sent. This conveys variations in amplitude. Still another, known as PWM or PLM, for pulse width or length modulation, conveys amplitude by the length of time the pulse lasts.

PCM accomplishes this by using a set of patterns or codes, each of which conveys specific information about the sample which it represents. Each of these patterns consists of an arrangement of electrical pulses which always contains a definite and constant number of pulses. These pulses are either "on" or "off", that is, present or absent. Thus, as long as these groups of simple on-off pulses are received properly, speech sent over PCM is reproduced perfectly.

The more code-patterns there are available, the more faithfully the voice wave can be reconstructed at the receiving end. Experiments have shown that patterns or code-groups using six or seven pulses assure high quality transmission. The system demonstrated employs code-groups of seven pulses. By using different combinations of these pulses, 128 separate codes are avilable. During the demonstration the improvement of quality with the addition of pulsas was shown by transmitting first with only a one-pulse system and then adding others one at a time.

The coding tube—actually an electronic brain that operates so quickly no human brain could hope to compete with it—is not impressive in size. It stands only 10 inches high, is a couple of inches across, and at first sight looks like almost any oversized radio tube.

All the 128 codes available in the seven pulse code-group are perforated in appropriate order in a special plate inside the tube. This plate is so placed that a beam of electrons can sweep across the seven elements of any one code-group. Which one it actually sweeps across is determined by the position of the beam, and this in turn is determined by the amplitude of the signal at the time of sampling.—**THE END.**

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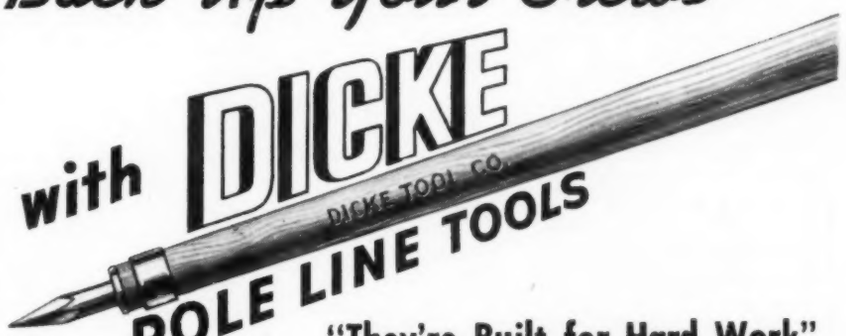

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Employee Medical Service

(Concluded from page 50)

the efficiency of each employee by pointing to correction of conditions.

The program should also include periodic re-examinations. In some industries these are required by local and state laws; they may one of these days be required of all who come in contact with the public or other workers.

These periodic re-examinations are the best way in which to fight further absenteeism due to illness for they prevent even such time-killers as common colds and light flu attacks which can either do so much toward creating short telephone office shifts or causing worker efficiency to drop as much as 50 per cent even though they may be still on the job.

Accidents

THE PROGRAM should also include a liberal "*what to do*" in case of accidents in the telephone office. First-aid kits should be spotted at strategic locations throughout the building in such a manner that one is always readily at hand. The local Red Cross chapter, has as part of its service, a program of first-aid education which every telephone office should investigate and the training that can be given every employee will sooner or later prove of invaluable aid.

Elimination or absolute control over all general health hazards within the telephone office should be part of such a program; and this includes a scientific application of air conditioning, lighting and other mechanical appliances and fixtures which can not only aid the efficiency of employe's efforts but keep down the need for expensive medical care.

It should also embrace a scheduled program of what to do in case any staff member becomes sick and every employee should know that exact routine which should include which ambulance to call, to what hospital the employee is to be taken, what doctor to call, etc. Every detail of "what to do when someone gets sick" should be worked out ahead of time and posted throughout the telephone office so that every employee knows exactly what steps to take when that emergency does occur. Then there will be no slip-ups and no mistakes made.

The adaptability of group plans of insurance for hospital and medical services should be investigated closely; there are today many such plans adaptable to any small business, including the Blue Cross plan now popular in many areas. If the organization is too small for even those available in its community this problem can often be solved by two or three firms going together and collectively obtaining this most valuable service. All such possibilities, which can be very economically applied to even the smallest telephone office, should be thoroughly investigated. Local hospitals, doctors, the secretary of the medical society and even major insurance companies have such information and will be glad to help the plant executive work out such a plan for his own institution.

"And then came the first of many difficulties — wire shortage, pole shortage, telephone strikes."

The control and elimination of occupational hazards in the building should also be undertaken. This can include elimination of dark corners, narrow or step stairways, crowded aisles, broken or chipped floors and any other part of the institutional construction which could cause accident or injury. From the standpoint of financial liability in case of accident, without any consideration of our medical program, such steps are indeed wise.

Sanitary Facilities

ATTENTION to sanitary facilities of the telephone office is also of great importance. A few dollars spent in improving sanitary facilities are always a wise investment. There should never be anything slipshod about this phase of the telephone office's operation.

Health education can be carried on with the aid of local organizations and groups such as the Red Cross and other similar units. Most of this work is done without charge as a part of the basic program of these organizations and they are glad to cooperate in providing such health education . . . even to the outlining and putting into operation of a complete program for us.

Educational Programs Start With Foreman

THE EXPERIENCE of most firms has been that any such educational meetings as may be conducted in the telephone office should be done on paid-time rather than on the employe's time. With the former there is little trouble with absenteeism and no resentment of the program with the latter the persons who most often need such education will be those absent from the program or vigorously protesting against the idea.

Such education must start with the people who fill the "straw-boss" role in our organizations. They have the authority to put these things into practice and generally the capacities to see that they are carried out. There should be definite responsibility at all times for every phase of the carrying out of the program.—THE END.

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Build LINE SECURITY with CHANCE ANCHORS

CHANCE ROCK ANCHORS Hold WITHOUT THE AID OF LEAD OR CONCRETE

Developed particularly to eliminate the need for lead or concrete grouting in solid rock anchoring, the Chance Rock Anchor is installed by simply drilling a 2" hole, dropping in the anchor, and turning the rod with a bar through the Tripleye —the anchor expands and bites securely into the rock. Of certified malleable with a heavily galvanized steel rod, the Chance Rock Anchor is so constructed that the harder the pull on the rod, the tighter the anchor wedges into the rock.

CHANCE CONE ANCHORS Save ON INSTALLATIONS IN ROCKY SOIL OR HARDPAN

The economical Pyramid Cone Anchor is sturdily built of high quality malleable iron with flat, opposing faces which wedge solidly against tamped rock. The flaring base adds to the holding power by giving a final grip to the wedging surfaces. The Cone Anchor also features a Destructible Nut Retainer to prevent the anchor from riding up the rod during installation and to simplify disposal of the rod by unscrewing or driving into the ground.

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How much will an anchor HOLD?

Chance engineers have developed a new formula for determining the type and kind of anchor to use for every guying condition. Your copy is ready and will be sent upon request.

A·B·CHANCE CO · CENTRALIA MISSOURI

All-Weld Steel Construction

(Continued from page 32)

riphery, the outer ends of the end members being the last to be welded. Because one end of the member is not fixed while the other end is being welded, the shrinkage will take place without straining the weld or the member, and accumulated stresses due to shrinkage of welds between fixed points will not occur.

Welded Frame Saves Approximately 28%

THE FRAME for this building addition was first designed for standard riveted connection and its tonnage and cost obtained by various fabricators; then an alternate design of a fully continuous welded frame was developed and its tonnage and cost obtained. Based on the figures of the fabricators, the adoption of the continuous welded frame for this building has resulted in a saving of approximately 28 per cent of the tonnage required by the riveted frame, and approximately 30 per cent in erection time. The actual cost of the structure to the fabricator will remain a secret, but it is safe to say that this type of frame

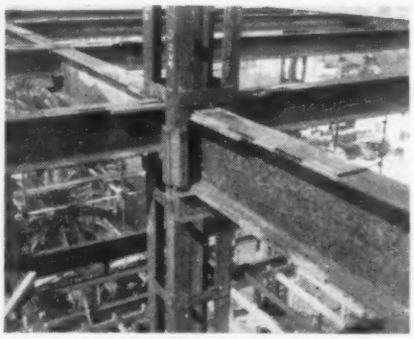


Fig. 3—Floor beams made continuous across the girder by butt welding of top flanges.

besides having structural superiority will provide a substantial saving.

It is a known fact that different materials have different bending moments, consequently tile, brick, terra cotta, and cement work have to be coordinated in order to withstand shakes caused from earth tremors. It was for this reason that considerable thought was given to the type of structure that should and would be used in the two story addition to the Long Beach Main central office building.—THE END

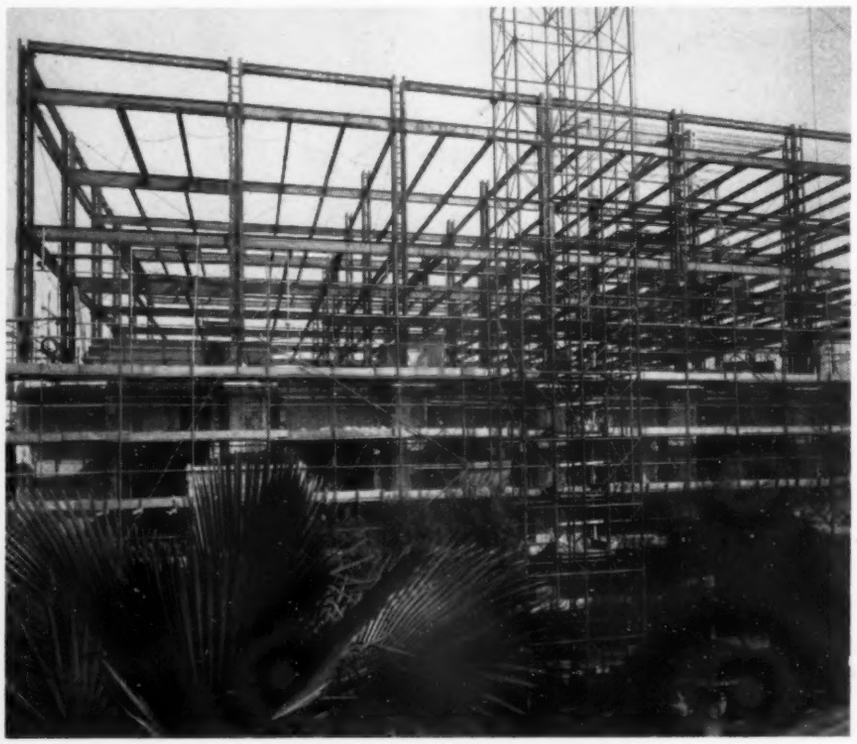
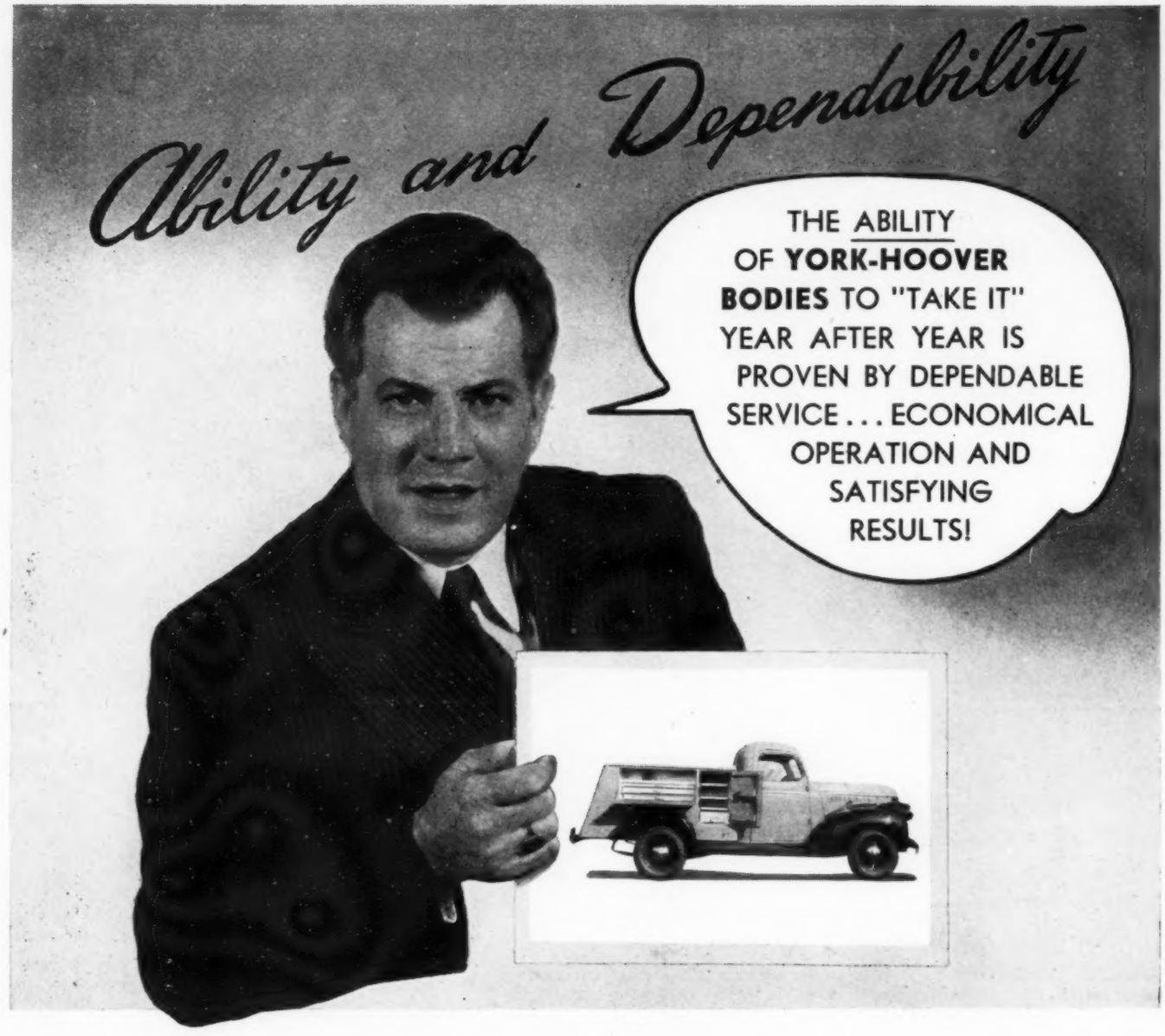


Fig. 2—All-weld steel construction was result of many months of work.

Ability and Dependability



For over 55 years sound engineering and skilled craftsmanship have been the basic factors contributing to the reliable performance of York-Hoover bodies . . . factors, too, that have earned and maintained the valued confidence of our good friends and customers.

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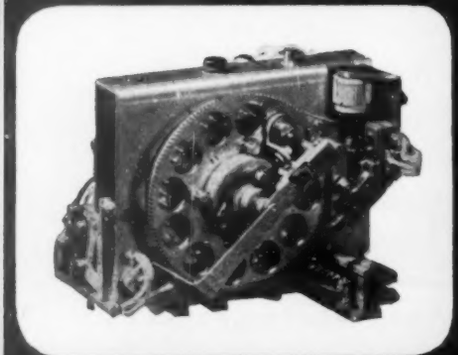
BODY DIVISION **YORK, PENNSYLVANIA**

LINK THE WORLD'S



THE IMPULSE REGENERATOR

- *has been developed because—*
  - *(a) the speed of the dial on a subscriber's telephone may vary between 8 and 12 impulses per second and the "break" period may be between 63% and 70% of the impulse.*
  - *(b) the line to line insulation of a subscriber's line may be as low as 50,000 ohms and its loop resistance 750 ohms.*
  - *(c) in result, the impulses become distorted before operating a selecting mechanism.*
- *has therefore been designed to receive impulses before they become too distorted and re-transmit them at the correct speed and ratio within narrow limits.*
- *has the facility of catering for any number of impulse repetitions; the loop and leak resistances in each stage can be of any value up to 2,000 ohms or as low as 50,000 ohms respectively.*

A7103-A2-L

RESOURCES . . .

in the Health Resorts

Not least of nature's contributions to the well-being of mankind are the health resorts where the tonic air of mountains or the curative properties of mineral springs help to ease bodily ills and relieve nervous strain. The location of natural amenities is governed by geographical and climatic factors. In result, communities which arise there are separated, in fact are often remote from, normal commercial or residential towns. This gap must be bridged by telecommunications for contact must be maintained with business and family life. Connections must frequently be estalished over some distance often through a series of intervening exchanges. Strowger Automatic Telephone equipment is available in a form particularly appropriate to this need. The Strowger Impulse Regenerator enables automatic switching to be effected throughout multi-exchange areas for it receives and stores trains of dial-impulses, many of which may be distorted, and then transmits equivalent trains of perfect impulses. Problems arising from impulse repetition are solved and dialling can be effected through any number of exchanges in tandem.

with

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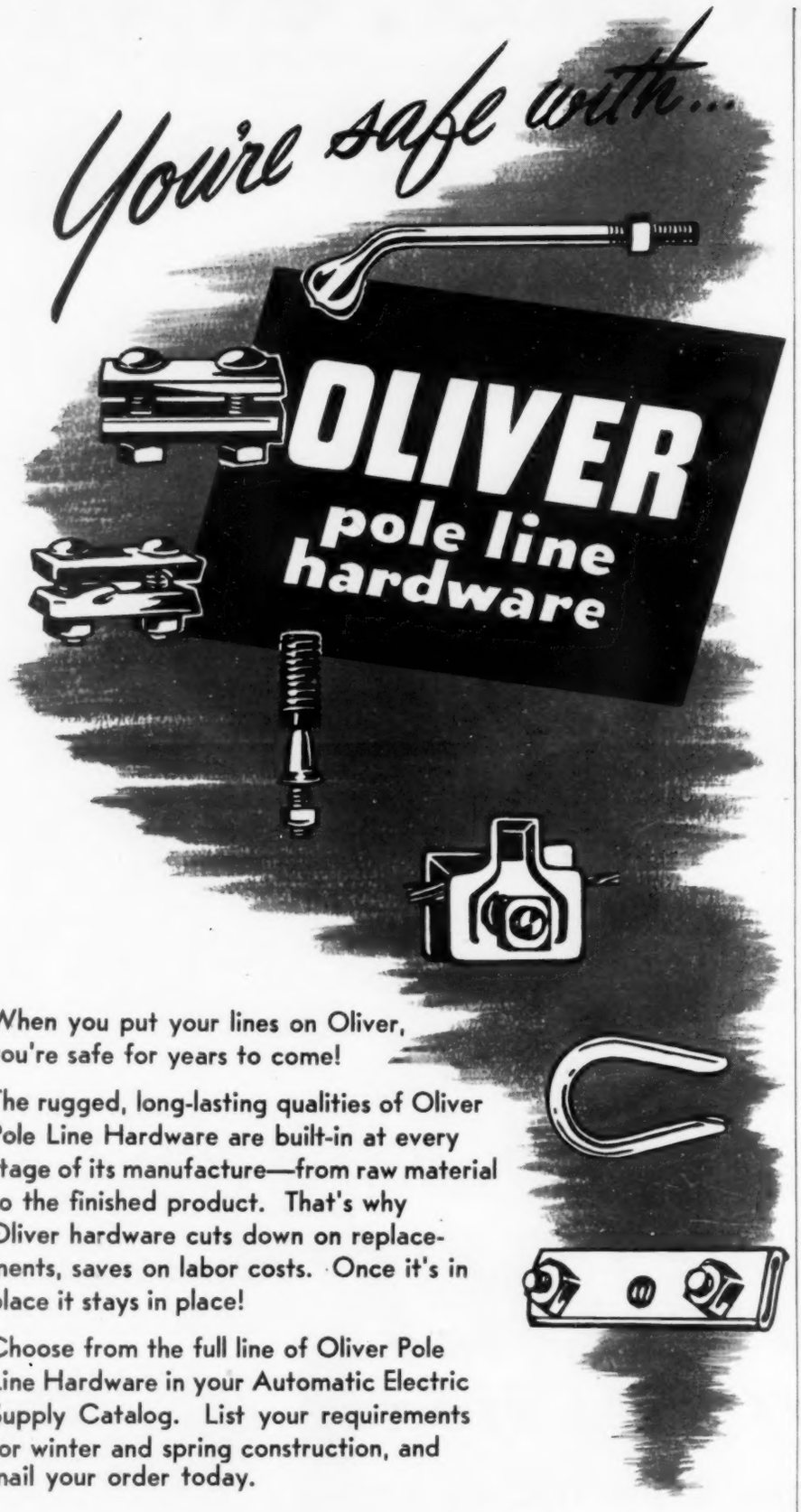

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The rugged, long-lasting qualities of Oliver Pole Line Hardware are built-in at every stage of its manufacture—from raw material to the finished product. That's why Oliver hardware cuts down on replacements, saves on labor costs. Once it's in place it stays in place!

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Walter Schrupp Dies; Auto Accident Victim

Walter Schrupp, 45, popular plant superintendent of the western division of the Central Telephone Co., Sioux Falls, S. D. died Oct. 26 following an automobile accident on October 25.

Mr. Schrupp had driven from Sioux Falls to Pipestone, Minn., to see a football game in which his son participated and on the return trip on Oct.

Walter Schrupp, dies as a result of injuries received in auto accident.

25 his car struck a concrete bridge 26 miles north of Sioux Falls. The accident was attributed to a heavy fog. Interment was in Granite Falls, Minn., Mr. Schrupp's home town.

He is survived by his widow, Esther; a daughter Edith Annette and his son Walter.

During 1919 Mr. Schrupp was employed by the Northwestern Bell Telephone Company on construction work as lineman at Granite Falls and Montevideo, Minnesota. From March 1920 to November 1928 he was employed by the Granite Falls Telephone Company as combinationman and wire chief. From December 1928 to July 1929 he was employed by the Boyd Telephone Company at Boyd, Minnesota as manager.

In July 1929 he entered the employ of the Central Telephone Company as manager of it's properties at Canby, Ivanhoe, and Porter, Minnesota and Gary, South Dakota. In January of 1933 he was promoted to district manager at Sac City, Iowa. In March of 1934 he was promoted to district manager at New London, Iowa. In January of 1944 he was named Western Division Telephone Engineer with headquarters in the company's general offices in Sioux Falls.

Americans Used Telephone 42 Billion Times in 1946

The United States, with nearly three-fifths of the World's telephones and more than 42 billion completed conversations last year, is the "talkingest" nation of them all.

In 1946 the average American used the telephone 301 times, according to the new issue of Telephone Statistics of the World released by the American Telephone & Telegraph Company. No other country even approached the 42 billion total in conversations.

At the beginning of this year, the United States had nearly one telephone for every four persons, as compared to the world average of about one for every 43. New York lead the world's cities with the most telephones in service—2,213,828, which is more than in all of France. On a per capita basis, San Francisco was on top among the major cities with about one telephone for every two persons. Washington, D. C. ranked a close second in this respect and next in line were Stockholm, Sweden, and Denver, Colorado. By contrast, Yokohama, Japan, had one telephone for every 89 persons.

The world total of 54,600,000 telephones on January 1, 1947 represented an increase of some 12,000,000 in the last seven years. Of these, 10,800,000 were added in this country. The United States had 31,611,000, or 57.9 per cent of the world's telephones at the beginning of this year. (Since that time over 2,000,000 more telephones have been added in the U. S.)

More than two-thirds of the world's telephones are operated under private enterprise, and 85 per cent of these are in the U.S.A. The other third are operated by governmental agencies. The United States has nearly four times as many telephones as the total served by the four largest government systems—those in the United Kingdom, France, the U.S.S.R. and Sweden.

Sweden, with one telephone for every five inhabitants, ranked second in telephone density, while Canada was third with about one for every six. The Soviet Union has one telephone for every 140 people.

At the beginning of this year there were 18,700,000 dial telephones in this country. This was about three-fifths of the dial telephones in the world.

Ninety-six per cent of the world's telephones can be reached from any telephone connected with the American telephone network.

The A. T. & T.'s eight-page pamphlet of tables and charts is the most comprehensive compilation of world telephone statistics since before the war.

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TELESEAL has a Whitney Blake Teleplated** hard copper conductor, a low moisture absorbing insulation, and a neoprene tire-tread type jacket over and adherent to the insulation.

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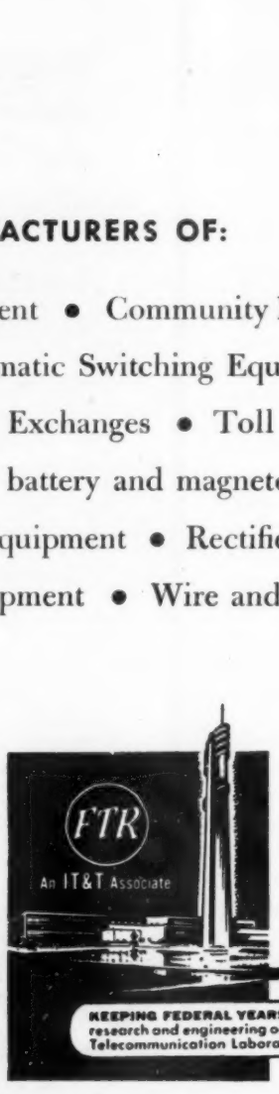
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to the U. S. I. T. A.

THANK YOU

—for the warm and friendly welcome which we received at this, our first exhibition in your Annual Convention.

—for your interest and enthusiasm in the many new telephone developments which were shown in our exhibit.

—for the expressions of confidence and good will which were extended to us by your representatives.

We consider it a privilege and an honor to have been among those present.

CONGRATULATIONS

—on your 50th Anniversary.

—on the tremendous strides which it represents in the field of telephone service.

—on an outstanding convention which you can view with justifiable pride in a job well done.

In the years ahead, we, here at Federal, hope to play an ever increasing role in contributing to the progress of America's Independent Telephone Operating Companies—to help you give improved service, to more subscribers, at a minimum cost.

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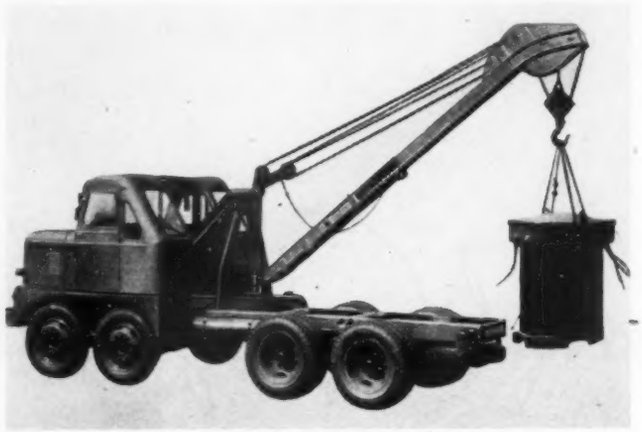
Milford Crane & Machine Co. Introduces Service Truck

The Milford Special Service Truck represents the realization of more than two decades of thinking and planning of a better power and transportation vehicle, with a special object in view, of providing a rationally designed chassis, for the installation of a crane or winch and other special equipment.

The pilot model of the MILFORD Truck was put into active duty more than three years ago, and after a year of tests, has been in continuous service in uninterrupted day-in and day-out mileage-tonnage duty, with overloads on difficult terrain.

The practical necessity of two rear axles for adequate load carrying capacity, has long been recognized in commercial motor vehicle design. The limitations of the single steering axle are equally well understood. The dirigible duplex front axle system of the Milford truck is a natural development, to obtain the maximum dynamic balance, unit efficiency and load capacity, from the structure, without dangerous abuse of many of the component elements of the chassis.



New Milford special service truck.

The four-wheel front end suspension of the Milford truck consists of two front axles so sprung that the load is equally distributed between the two axles, with a steering linkage arrangement designed to provide the correct ratio of steering angles between the two axles under all conditions.

The four-wheel suspension provides the possibility of ideal load distribution between the front and rear axle groups. An important incidental advantage is the reduced unsprung weight, which means less shock to axles, springs, frame and steering elements. This low unsprung weight, balanced between the front and rear axles (of the front end assembly) by equalizer beams, eliminates many notorious evils of two-wheel steering, and offers important advantages in steering stability, riding quality and better load distribution. Shock overloads are substantially reduced.

The frame is lifted only one-half the height of any obstruction encountered by the wheels, due to the equalizer beam action. The rear axle is a standard bogie type that has been tried and proven in many of the heavy-duty trucks now in service.

The **dual service** cab is also a unique feature of the Milford truck. This cab was especially developed for the safe, efficient and comfortable operation of cranes, winches and other auxiliary equipment. In the Milford dual-service cab the controls for the spe-

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DILLON
DYNAMOMETER

DEAD ACCURATE
EASY TO USE

Takes out guesswork of "sight and sag", or oscillation wire stringing. Hooked on in a jiffy. Indicates tension in seconds. Measures only 8¼" x 6¼" x 3". Capacities 500 to 20,000 lbs.

The Dillon is universally used in telephone work. Accuracy, and long-lived dependability are the answers. Indicates exact tension in guy strand, messenger and wire.

Many other uses where pull, torque, weight or overload are vital factors.

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cial equipment are centralized in the rear compartment for convenient operation. The driver turns around with his seat, facing the work and ready to work in a comfortable position, on the same seat which serves him for driving. He has excellent vision in front and to either side of him, and it will be noted that this improved roomier cab actually does not take more loading space that the conventional cab.

The Milford truck is presently manufactured in two sizes. Model QX is rated at 33,000 lbs. GVW, Model QY is rated at 48,000 lbs. GVW. Patents pending on chassis and cab. For further information write New Products' Editor, Telephone Engineer Publications.

◆

Electric Products Co. Advances R. J. Peck

Gordon J. Berry, vice president of The Electric Products Company, has announced the appointment of Robert J. Peck as district manager of the company's New York Office, 126 Liberty Street, New York City, effective October 1, 1947.

Mr. Peck will handle all sales and service negotiations in the territory which consists of the New England States, Eastern New York and Pennsylvania, New Jersey, Delaware, Maryland and Virginia.

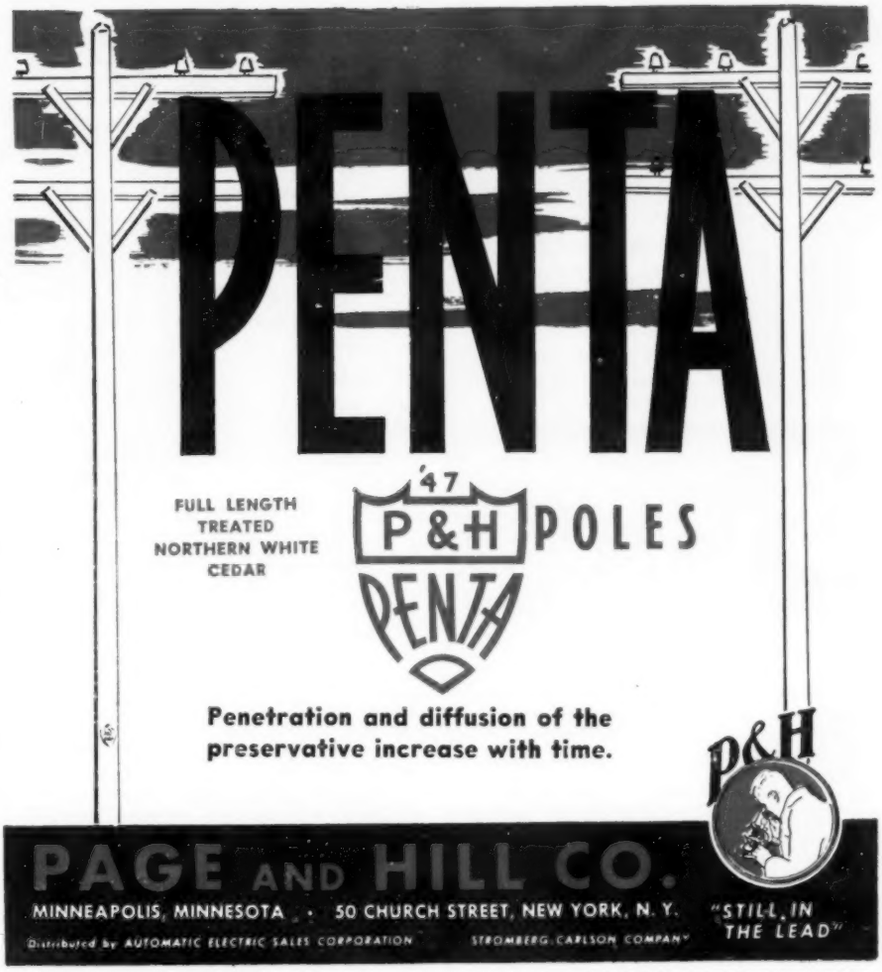
◆

New Sta Safe Plastic Eye Mask

A new safety feature in eye masks has been introduced by Standard Safety Equipment Company. Each plastic lense is individually injection-molded to a 6.00

New Sta Safe Plastic Eye Mask.

(*Please turn to page* 84)



We're living in an age of specialists, today. Take the field of medicine for example . . . one doctor may diagnose, another treat, still another operate. Each is a specialist in his own field. The folks at RUNZEL are specialists, too. Specialists in making cords, wires and cables for the telephone industry. No thousand-and-one items of equipment at Runzel! Just cords, wires and cables—the ***finest*** cords, wires and cables in the industry.

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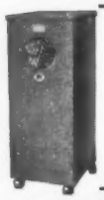

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SH	SBG	SGF	TAY	CBE	CEB
SJ	SBH	SGH	TBL	CBM	CEC
SL	SBX	SGJ	TBN	CBY	CEQ
SN	SDE	TB	TBQ	CCC	
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Many other codes in smaller quantities. Complete relay assemblies, mountings and covers.

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HELP WANTED: Switchmen, switchboardmen, and equipment installers by large Independent telephone company operating a large number of manual and automatic exchanges in the Middle West. Write giving age, experience, type of work and salary expected. Box No. 8525 c/o Telephone Engineer Publishing Corp.

HELP WANTED: Equipment man qualified to install and maintain P.B.X. and P.A.B.X. equipment. Rate $1.75 per hour. Permanent employment. Write Box No. 8526 c/o Telephone Engineer Publishing Corp.

HELP WANTED: Man to rebuild small switchboards. Steady employment, good wages. Telephone Repair & Supply Co., 1760 Lunt Ave., Chicago 26, Ill.

HELP WANTED: Reliable telephone lineman and trouble shooter, good wages, Central Telephone Company, Clear Lake, South Dakota.

CABLE SPLICERS WANTED. Top pay rates. Chance for advancement for experienced men. Neale Construction Company, 432 West Crane, Topeka, Kansas.

HELP WANTED: Combination trouble, construction and maintenance man on common battery plant with considerable cable. Permanent for right man. Good wages. Give age and experience. Write J. H. Crawford, Manager, Consolidated Telephone Co., Irvine, Kentucky.

Position Wanted

POSITION WANTED: Sales Engineer for leading manufacturer on anything in the telephone line. Experience with the Engineering & Construction Depts. for the Bell System & Army Signal Corps. Education 3 yrs. college. Presently employed selling complete line of electrical appliances. Will consider any location in U. S. Married, 2 children, age 26. Best References. Write Box No. 8527 c/o Telephone Engineer Publishing Corp.

POSITION WANTED: Retired Bell man wants position as Central office repairman. Can handle local, common battery or machine switching. Southern territory preferred. Box No. 8531.

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5-one position Western Electric 1240-B Switchboards. Each switchboard is equipped with 165 lines, 15 cord circuits and wall main distributing frame.

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The above switchboards will remain in service in south eastern Nebraska for approximately 60 to 90 days and if you desire to inspect the boards while in service, we will furnish you the exact locations.

For prices and further information, write THE LINCOLN TELEPHONE AND TELEGRAPH COMPANY, Supervisor of Supplies, P.O. Box No. 633, Lincoln 1, Nebraska.

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FOR SALE: Telephone property in the Red River Valley composed of two exchanges, 500 telephones, magneto. Manager and owner ill, must retire. Twin Valley Ulen Telephone Co., Twin Valley, Minn.

FOR SALE: Telephone Exchange in Coal Field of West Virginia. 250 telephones, gross annual revenue $18,000. If interested, write Oak Hill, W. Va. Box 173.

FOR SALE: Telephone exchange with 436 subscribers in town of over 900 population. Write La Belle Telephone Co., La Belle, Mo.

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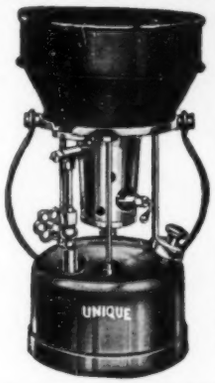

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Additional Features: Long-life figure "8" generator—with orifice scraper. Rugged semi steel top plate. Powerful pump. 16 gauge welded steel tank with bottom shock ring. Size 8" x 13". Weight—15 lbs. Popular size for 6", 7", and 8" pots.

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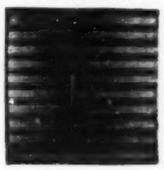

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OLIVER
TELEPHONE LINE
BRACKETS
FROM THE COMPLETE LINE OF OLIVER POLE LINE MATERIALS

You will find all types and sizes of brackets required for telephone work in the complete Oliver line. Some of the popular styles are illustrated. Various types suit the practices and requirements of leading telephone, telegraph and railroad companies. For full details see Catalog 43.

South Tenth and Muriel Streets · Pittsburgh 3, Pa.

MAKERS OF POLE LINE MATERIALS SINCE 1894

curve to provide, not only for wide vision and impact-resistance, but for flawless optical perfection. There is no distortion, no reflection. The lenses are snap-in style; they lock securely but are easily replaceable.

Weighing less than 2 ounces, StaSafe eye masks give maximum coverage, can be worn comfortably over corrective glasses and are curved to fit the face. Specially designed air vents at both sides provide constant cross ventilation. The mask's modern attractive appearance appeals to both men and women. StaSafe eye masks are available in either clear or eye-resting green tinted lenses; frames may be white or green. For more information write to New Products Editor, Telephone Engineer Publications.

Templeton, Kenly Releases Bulletin on Simplex Jacks

Templeton, Kenly & Co., Chicago, manufacturers of Simplex Jacks for use in shops and plants as well as by contractors, bridge and road builders and truckers, has recently issued a new revised descriptive bulletin on its Simplex lever, screw and hydraulic jacks. Featured on the bulletin's front page is a detailed description of the Simplex Industrial Hydraulic Jacks. To the previous line of seven hydraulic jacks of 3, 5, 8, 12, 20, 30 and 50-ton capacities there has now been added a new 100-ton jack. The three largest of these hydraulic jacks have high and low speed pumps and double lever sockets.

The center spread of the bulletin describes in detail the new single acting Simplex Ratchet Lowering Jacks. Specific features oulined include (1) double lever sockets to facilitate work in cramped quarters and angular lifting, (2) a base locking hook that is foot operated and (3) possess the ability to lift their full capacities on the toe and on the cap. These 5, 10, 15, 20, 25 and 35-ton jacks are used by contractors, bridge and road builders, truckers and operators of all types of heavy equipment for general purpose lifting, lowering or moving. It was largely through this jack that the only Gold Medal for the Safety of Jacks was awarded to Templeton, Kenly and Company by the American Museum of Safety.

Specification charts on all these and many other jacks as well as on Simplex-Jenny Center-Hole Hydraulic Pullers, the Util-A-Tool, Drop Forged Steel Trench Braces and Timber Braces are also included in the new bulletin. For full information on any of these Simplex products write for Bulletin: Industrial 48, Templeton, Kenly & Co., 1020 S. Central Ave., Chicago 44.

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NO. 86A — NO. 86C
1000 or 1600 ringers

The Practical Telephone for Magneto Exchanges

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Ideal for Offices

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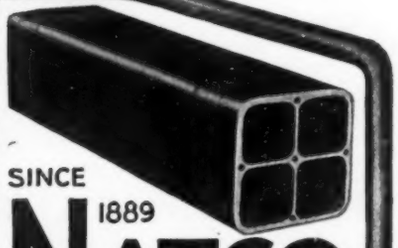

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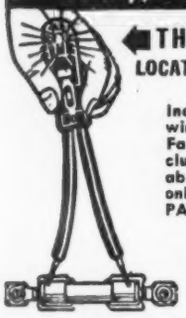
The proved and standard Protection for Underground Telephone Cables.

Cheapest in the long run. Highest quality and a full line of shapes.

National Fireproofing Corp.
202 E. Ohio Street, N. S.
PITTSBURGH, PA.

Test-O-Lite

TESTS ANY VOLTAGE...
100 to 550 Volts, A.C. or D.C.
Safely, Swiftly, Surely



THE NEON GLOW
LOCATES TROUBLE INSTANTLY

Indicates hot or grounded wires. Tells AC from DC. Far superior to ordinary clumsy test bulb Indispensable in shop or home. The only pocket-size tester with PATENTED SAFETY FEATURE.

Life-time guarantee. Purchase thru electrical dealers.
Pat. No. 1,778,883.

RTC-2 VINCENT RARE GAS RELAY

for harmonic or coded bells. Dual purpose device which economically improves both ringing and transmission on party lines. NO MOVING PARTS. Fully guaranteed. Can be installed in a minute.

L. S. BRACH Mfg. Corp.

PREMAX

Property Marking on Telephone Lines

Economically Accomplished With Premax Aluminum Tags

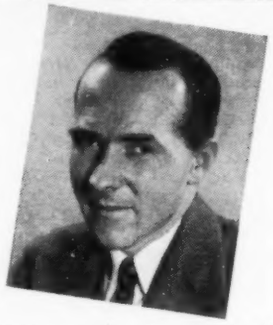
Once telephone poles and other properties are marked for identification with Premax Stamped and Embossed Tags, or Letters and Figures, the job is done for all time. No maintenance, for Premax Markers outlast the average pole.

Whether it is a new line or renewal of obliterated stenciling, investigate Premax Markers—they materially reduce maintenance costs.

Premax Products

Division Chisholm-Ryder Co., Inc.
4817 Highland Ave., Niagara Falls, N.Y.

THE BACK OF THE BOOK



By JOHN G. REYNOLDS
Managing Editor

DANGEROUS IGNORANCE . . .

A SURVEY indicates that nearly a third of the people believe that a handful of individuals own most of the corporations in America. If accurate, this reveals a lamentable lack of knowledge of who keeps the wheels of industry turning in the United States. For example, no industry has a more important relationship to the average family than the telephone industry.

Who owns this great industry? The answer is hundreds of thousands of plain American citizens in every walk of life.

Knowledge of the true facts of industry is as important to the future of the nation as is an informed citizenry on the principles of representative government. Public ignorance of the ownership and workings of key industries is a fertile field for the demagogue, the socialist and the communist. Once these industries are brought under control or ownership of government, the authority of government will become irresistible. Individual opportunity and freedom, the private investment of savings, and competition, will disappear.

• • •

YOU BET YOUR LIFE . . .

THINK THIS one over:—40,000,000 automobile drivers, some good and some bad; 140,000,000 pedestrians, including the very young, the very old, the lame, the halt and the blind; 34,000,000 automobiles, some new, some old, and many ready to fall apart, and 3,000,000 miles of highways, with many a hazard in every mile.

Add all these together and you have America's traffic lottery, a complex game of life and death in which each one of us, willing or not, must have a hand.

Last year, 33,900 were killed and more than 1,300,000 injured in U. S. street and highway accidents, according to figures compiled by The Travelers Insurance Companies. It was a year in which most of us did not yet have that new car and those new tires with which to drive as frequently, or as fast, or as far as we might have liked. But the casualties were heavier than in any year since 1941. Why?

Most of the 1946 dead and injured were killed or hurt because they took a chance. They didn't pause to consider the risk because they didn't expect to lose. They did lose.

What of this year? This month? Today?

Some will lose because they are willing to take a chance, no matter how great the odds. Others will lose because they have not learned the game well enough to play it safely.

• • •

BUG-TALK . . .

HELLO, employee publication of the Peninsular Telephone Company, records the story of a crew testing a new toll board. One employee said to another, "We've gotten rid of another bug."

A new operator being insructed in the use of the toll board overheard this and later told the manager of the exchange she didn't like the new board.

"Why?" he asked.

"I don't want to work on anything that has bugs in it," she said, "and if the board has this many bugs in it now, how many will it have later?"

Seeing that she was serious, the manager lost no time in explaining that all the bugs would be exterminated.

• • •

CABLE BOOT . . .

ONE OF THE crews working on coaxial cable used more than ingenuity to protect the open ends of a section of cable when the approaching hurricane recently made them cease work on a watery stretch near Fort Pierce, Florida.

Passersby after the storm did not know about these cable ends, which were sticking straight up above the flood waters, all they could see was a man's rubber boot, upside down, and lashed securely.

Nicotap

THE FAST, DEPENDABLE Nicopress WAY OF MAKING LINE AND DROP WIRE TAPS

THE NICO-TAP IS SPLIT

THERE IS NO NEED OF CUTTING THE LINE TO MAKE THE CONNECTION—JUST SLIP THE SLEEVE OVER THE LINE WIRE AND COMPRESS

12 BWG TO 12 BWG
Stock No. T2-109D

12 BWG TO No. 17-18 DROP WIRE
Stock No. T2-109 x 045D

17-18 B&S TO 17-18 B&S
Stock No. T2-045B

Ask Your Jobber

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY

LET'S SELL SUBSCRIBER CONVENIENCE...

AS A KITCHEN AID!

What housewife isn't looking for new ways to save time and energy?

Installation of a North wall handset in the kitchen where the average housewife spends much of her time will save many steps and minutes during the day. This efficient instrument takes up no valuable space. Yet it adds immeasurably to the ease of the daily household routine.

Install a North wall handset in your subscriber's kitchen.

THE NORTH ELECTRIC MFG. CO.

GALION, OHIO

TELEPHONE ENGINEER and MANAGEMENT

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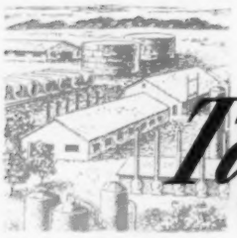
DETROIT

TECHNOLOGY DEPARTMENT

Merry Christmas

DECEMBER, 1947



Taft, California

Oil is the subject of the most outstanding chapters in the history of this rich California city. It is quite natural then that the economy of this area should be based chiefly upon the production and refining of this fabulous mineral.

While black gold is being pumped from beneath this land the farmers are busy growing their share of Kern County's record annual potato and cotton crops on the fertile plains surrounding Taft.

This combination of oil and agriculture provides a monthly payroll of over a million and a quarter dollars which gives Taft the distinction of being the wealthiest city per capita in the whole of rich Kern County.

The Kern Mutual Telephone Company which serves this area employs the complete directory publishing services of our organization.

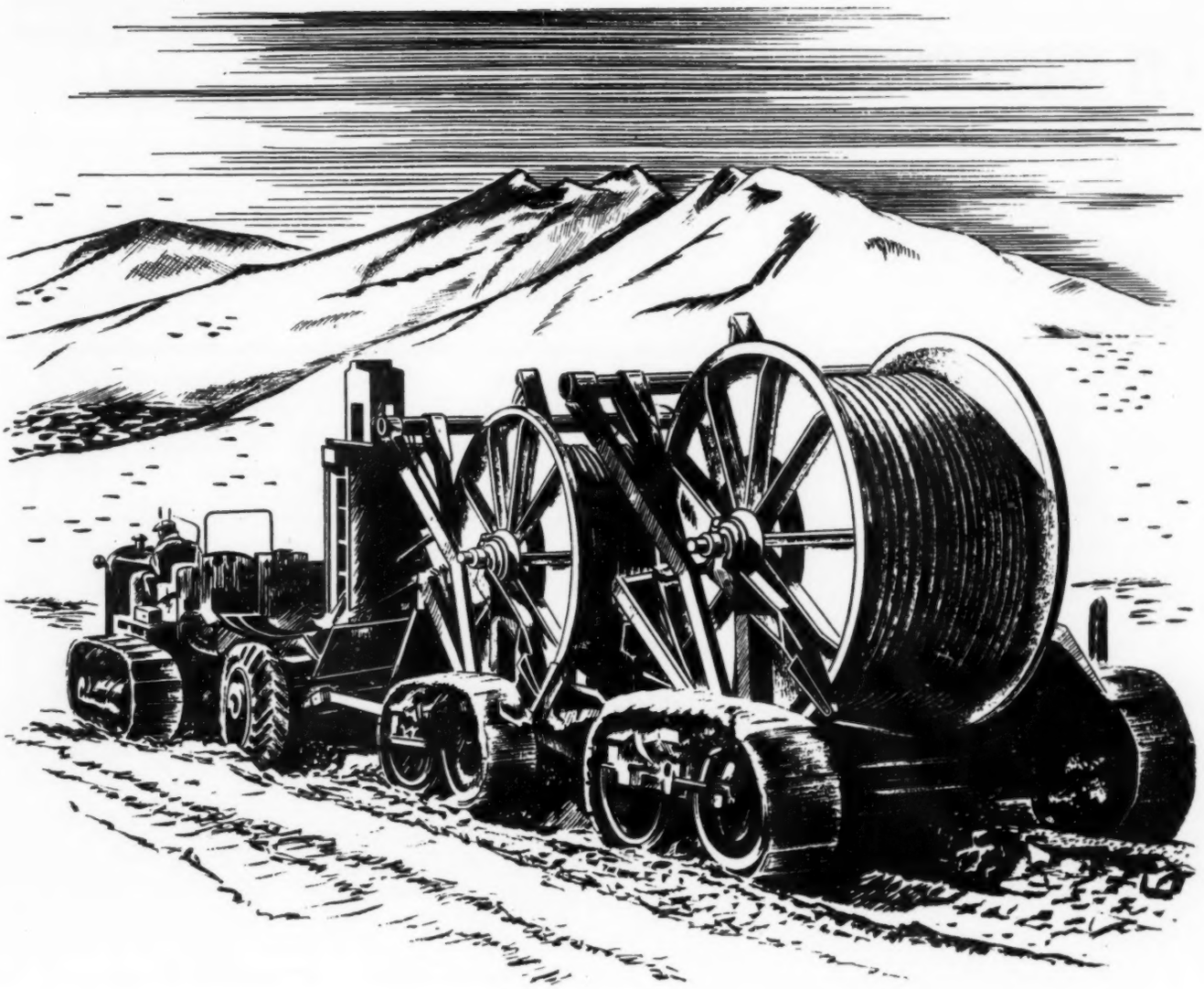
In the preparation of the Taft directory, as with the telephone directories in the more than 1,000 other cities and towns we serve, we are ever mindful of the public relations job that a modern, accurate directory can do. While we expend every effort to increase the gross advertising revenue from directory operations, we emphasize accuracy in production in order to help the Telephone Companies which we serve in maintaining good relations with subscribers.

If you contemplate changes in your directory publishing procedure, we would welcome an opportunity to discuss our services with you. No obligation, of course.

GENERAL TELEPHONE DIRECTORY COMPANY

EASTERN OFFICE: 185 NORTH WABASH AVENUE, CHICAGO 1, ILLINOIS, TELEPHONE STATE 5478
WESTERN OFFICE: PRESS-TELEGRAM BUILDING, LONG BEACH 12, CALIFORNIA, TELEPHONE 6-7221

THE



5 YEARS AGO THIS MONTH

One of the most dramatic construction jobs in telephone engineering was completed

"Most dramatic" is the term used by workers themselves after they finished laying the twin underground cable line between Omaha and Sacramento. It was on December 21, 1942, when the final connection was made between existing cable systems of the East and West . . . and one of the toughest construction jobs in telephone history was completed.

Temperatures ranged from 18 degrees below zero to 120 above, but the work went on. At one bad stretch over the Sierras—along the treacherous pass followed by the "forty-niners," the cables had to be buried in solid lava rock. The trench was made by exploding 26,000 dynamite shots, one every 12 inches. Yes, there was plenty of drama. There always has been throughout telephone history. But it's all part of the telephone *Spirit of Service,* in keeping with the industry's tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exide Batteries have been proving themselves worthy of that trust.

Exide

BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

IT SEEMS TO US

State telephone conventions ended this month with Oklahoma holding the final meeting of the year. A number of changes in officers of the various associations are noted as you will read in the reports as we publish them. F. M. BROWNE Kansas City, the new president of the Missouri association is well qualified to lead that group following the fast tempo set by the retiring president CHARLES BOUTIN, Cape Girardeau, who was a real whirlwind of action.

• • •

We enjoyed the Missouri meeting very much and were glad to hear that all future meetings will be held in the Hotel Governor at Jefferson City. It might be a little tough on the FOSTER McHENRYS' to act as hosts every year but we hastily add that the welcome they extend is the "nth" in hospitality. Their party for the visiting firemen was lovely.

• • •

Add to JOHN PORTER'S hobbies —its putting. While visiting the North Carolina convention last month this pride of Tarboro inveigled us into a putting round at the beautiful Pine Needles Hotel. Although he was called away before the round ended his cronies saw that this Editor did not suffer in having someone collect from him. LES WARNER of Automatic and COLBY KNAPP of Stromberg-Carlson were victims of the cold weather and saved their money.

• • •

REG KEPLER, Durham, N. Car., chairman of the North Carolina Convention Committee, is to be congratulated on the excellent program and arrangements. The Entertainment Committee provided amusement for almost every unscheduled moment.

• • •

Another hobbyist has reported. L. H. WARNER, president of Automatic Electric Sales Co. is one of the many amateur photographers we enjoy talking shop with—his pictures compare favorably in quality with those of others we have mentioned in this column such as WESLEY ANGLE and DR. RAY MANSON of Stromberg-Carlson, BOB MILES of Kellogg, and MORRIS BURTON and DINK ROBB of Texas.

The National Telephone Magazine

TELEPHONE ENGINEER and MANAGEMENT

DECEMBER 1947 **VOL. 51, NUMBER 12**

Editor, RAY W. SMITH • *Advertising Director*, ROY F. SMITH
Managing Editor, JOHN G. REYNOLDS • *Promotion Manager*, DON C. SORENSON
Washington Bureau, ROLAND C. DAVIES *and* FRED HENCK
Circulation Mgr., BERNADINE STEPHENS • *Production Mgr.*, MARGARET INDIA

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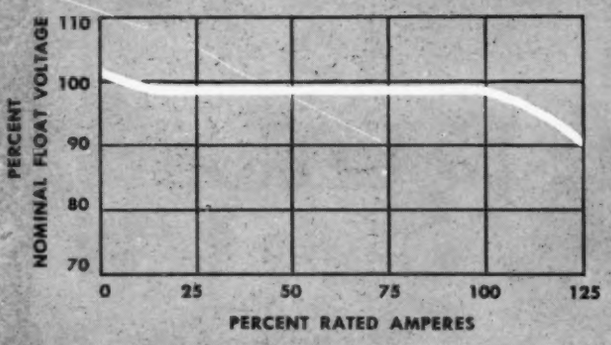
COVER: From Wisconsin came this view of a typical snow-bound road which makes an excellent background for our best wishes for a Merry Christmas to you and yours.

Published monthly by TELEPHONE ENGINEER Publishing Corporation
7720 Sheridan Road - Phone Rogers Park 3040 - Chicago 26, Illinois
West Coast Representatives, BRAND & BRAND
1052 West 6th Street, Los Angeles, California
Copyright 1947 by Telephone Engineer Publ. Corp.

VOLUME 51, NUMBER 12. Published monthly by Telephone Engineer Publishing Corporation. Office of Publication, Pontiac, Illinois. Executive and Editorial Office, 7720 Sheridan Road, Chicago, Illinois. Subscription: U. S., Cuba, Mexico, $2.00 per year; Canada $2.50; in all other countries, $4.00. Single copies, U.S.A. 20 cents; single copy JANUARY 15 BLUE BOOK BUYERS' GUIDE $1.50. Entered as second class matter at the post office at Pontiac, Illinois, under the act of March 3, 1879.

BATTERY-CHARGER FUNDAMENTALS—

how constant voltage improves voice transmission



Typical Voltage Regulation Curve of the E. P. Diverter-Pole Motor-Generator

To assure satisfactory voice transmission, the Battery Charger must maintain the output voltage of the battery as close as possible to a constant value. Transmitters may become noisy if they are subjected to an excessively high voltage, and may have to be replaced because of permanent damage.

The E. P. Diverter-Pole Battery Charger maintains inherently constant d-c voltage . . . regardless of fluctuations in the a-c power supply. Delicate, separately-mounted regulating devices are not required. The E. P. Charger provides a safe, continuous floating charge to the battery. In addition, it is so designed electrically and mechanically that user after user has gone on record that it is exceptionally quiet in operation and creates no objectionable electrical noise.

why EP motor-generators are best . . .

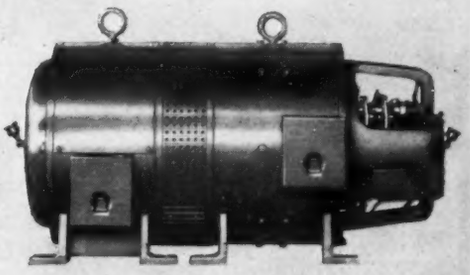
Since 1923, Diverter-Pole Motor-Generators have proved to be the most reliable, maintenance-free and efficient source of direct current for Telephone Exchanges. The characteristics of E. P. Diverter-Poles are ideal not only for the most satisfactory floating charge (a full floating charge is now the accepted standard), but also for carrying the major portion of the exchange load better than any other source of direct current.

The main reason for this superiority is that The Electric Products Company is a specialty manufacturer. For every exchange battery-charging application, E. P. designs and builds an individual Motor-Generator that fits exactly the requirements of the particular operation.

The result is Proved Performance as evidenced by the unequalled long-life records established by Diverter-Poles throughout the Telephone Industry.

For complete details . . .

ASK FOR BULLETIN 209



E. P. DIVERTER-POLE BATTERY CHARGERS

- **Are completely automatic**
- **Control exchange voltage well within high-low limits at all times**
- **Lengthen battery life**
- **Are self-protecting against dangerous overloads**
- **Will not "run away" or reverse polarity**

EP X-30

THE ELECTRIC PRODUCTS COMPANY

1729 CLARKSTONE ROAD CLEVELAND 12, OHIO

Precise

SIMPLE-TO-OPERATE

and

LIFELONG

For over half a century telephone companies the 'world over" have been and still are serviced by the Calculagraph device which is Precise . . . Simple-to-Operate . . . and Lifelong.

CALCULAGRAPH COMPANY

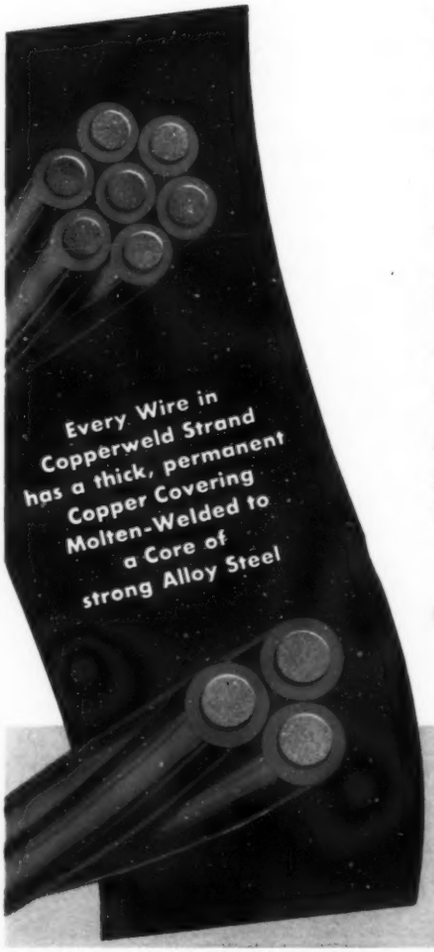
310 SUSSEX STREET • HARRISON, NEW JERSEY

ITS THICK COPPER COVERING IS ALSO

Ductile

THERE'S NO DANGER OF CRACKING, FLAKING OR PEELING

IT'S Copperweld Non-Rusting STRAND



For long-lasting guys and messengers, you can't beat reliable, time-tested Copperweld Strand.

This rugged strand, made of wire produced by molten-welding a heavy, permanent copper covering to a core of strong alloy steel, takes field punishment — can be bent, served, moused or clamped. The natural ductility of copper and the strength of the molten-weld eliminate danger of cracking, flaking or peeling. Since Copperweld Strand won't rust it always retains its original high strength.

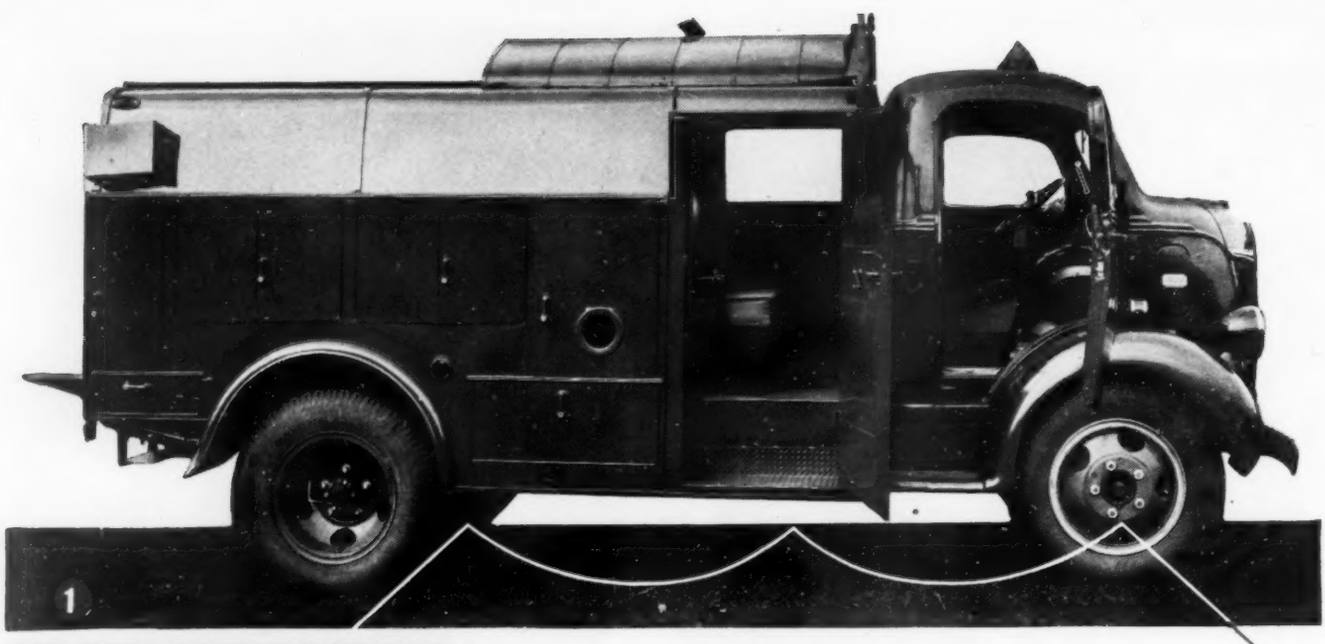
Copperweld has proved its value along thousands of miles of lines — supporting millions of dollars worth of cable and guying countless poles and towers. You can rid yourself of guy and messenger worries by specifying Copperweld Strand for all your jobs.

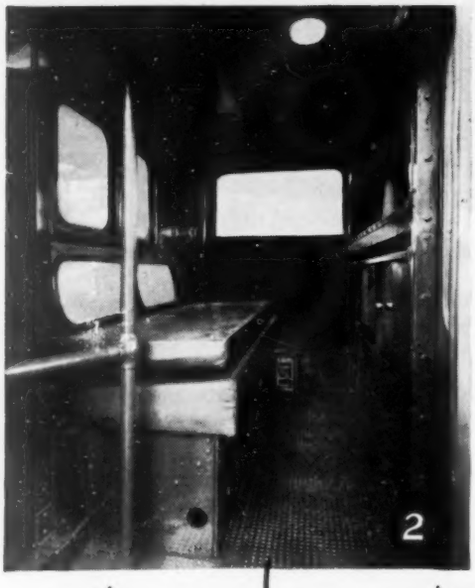
Write for Engineering Data

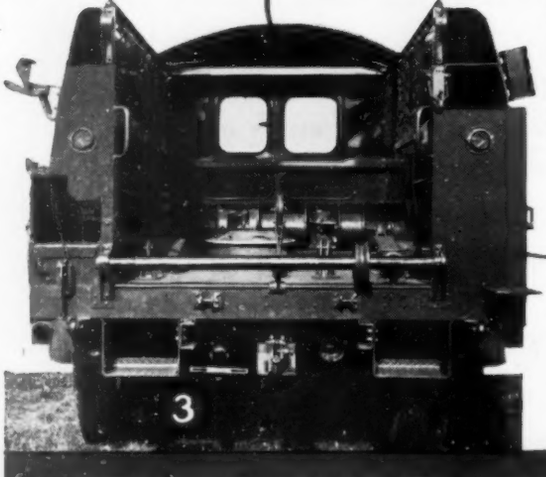
COPPERWELD STEEL COMPANY • Glassport, Pa.

SALES OFFICES IN PRINCIPAL CITIES

Copperweld GUY AND MESSENGER Strand







Your crews are going to like this new up-to-the-minute Highway Line Construction Body

Everything about this HIGHWAY Line Construction and Maintenance Body is up to the minute! Built to fit a 1½ or 2 ton chassis, which has space for all equipment, all materials. It is arranged for convenience and is perfectly balanced. The crew compartment built into the front of the body extends the full width of the body, providing ample room for three men and with a folding shelf used as a lunch table or a foreman's desk. The rear window of the standard cab is removed and the opening greatly enlarged to match the large opening in the front of the crew compartment, providing ample vision forward from the crew compartment.

Other well-known HIGHWAY equipment includes earth boring machines, pole trailers, cable reel trailers, splicer's trailers and winches. Write us today about your own special requirements. No obligation, of course.

① *Plenty of room for a five-man crew to ride to work comfortably.*

② *See how back of crew compartment seat tips down to give driver full view of winch.*

③ *Not an inch or a pound wasted in this rugged, efficient, comfortable new Highway body.*

HIGHWAY TRAILER COMPANY

Manufacturers of: Utility Bodies • Winches • Earth Boring Machines • Pole and Cable Reel Trailers and other Public Utility Equipment.

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NEWSLETTER

TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*

ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

NEWSLETTERS *on Alternate Weeks*

December 15, 1947

Dear Sir:

Move is underway to hasten conferences between Bell System and Independents to arrive at new basis of toll settlements between two groups which will more adequately compensate Independents for present higher cost of originating and terminating Bell toll business. Heavy increase of costs since present basis of settlement was fixed, assert proponents, plus greatly increased volume of toll business, have seriously depleted net toll earnings of many small Independents, and makes speed of action necessary.

* * *

Further ammunition for removal or reduction of excises paid by communications users was provided in late November by Legislative Reference Service of Library of Congress -- which normally prepares material only for Congressmen -- in study of all excises released to press. Although survey made no recommendations, it summarized arguments of proponents & opponents of communications taxes, showing that weight of arguments is on side of opposition. Most inexplicable feature of present taxes, it was stressed, is rate, which is higher on essential communications than it is on almost all luxuries.

* * *

General Tel. Corp. on Dec. 1, acquired more than 99% of outstanding common stock of Consolidated Tel. Co., Whittier, Calif. Consolidated serves about 15,000 automatic telephones. It is anticipated that it will be merged with Associated Tel. Co., Ltd., which is General Tel. Co.'s principal subsidiary in California.

Including properties of Consolidated Tel., General Tel. subsidiaries now serve about 270,000 company-owned telephones in California. Total number of telephones served by all subsidiaries is about 936,000.

* * *

On Bell rate front New Jersey Public Utilities Commission granted New Jersey Bell Tel. Co. somewhat less than two-thirds of its total rate boost request in approving estimated additional annual revenues of $10,515,000....In other developments, Northwestern Bell Tel. Co. applied for increase in South Dakota; Virginia Supreme Court of Appeals upheld in its entirety decision of state's corporation commission granting Chesapeake & Potomac Tel. Co. of Virginia rate increase last January....Illinois Commerce Commission on Dec. 3 approved permanent rate increases of $25,378,000 yearly for Illinois Bell Tel. Co. Order will net Ill. Bell $11,570,000 yearly after taxes. Commission denied requests that would have produced added $5 million annually.

Press-time roundup of rate applications & approvals indicates increased activity on part of Independent companies, with high approval percentage. Highlights of past 10 days activity include: California Public Utilities Commission started investigation of amendments to Uniform System of Accounts for telephone companies, presented by FCC., on Dec. 10....Hearings start Dec. 17 on application of Florida Tel. Corp. for rate increase approval....9 Illinois companies requested rate boost authority -- Tampico Farmers Mutual Tel. Co.; Assumption Mutual Tel. Co.; De Pue Tel. Co.; Peoples Mutual Tel. Co.; Eastern Ill. Tel. Co.; Ashley T. & T. Co.; Augusta Mutual Tel. Co.; Seymour Tel. Co.; Albany Tel. Co.

Minnesota Independents continue to lead in number of rate increase requests. Recent approvals granted Alvarado Tel. Co.; Middle River Tel. Co.; Wekstrom Tel. Co.; La Crescent Tel. Co.; Tri-County Tel. Co.; Fairmont Tel. Co.; Norman County Tel. Co.... North Carolina Commission granted application of Morris Tel. Co., to increase rates at Yanceyville.

* * *

In Washington State revised rate schedules filed by Pacific T. & T. Co. to produce $5 million additional gross revenue authorized by Director of the Public Utilities Department Zimmerman Oct. 20 were hailed by Mr. Zimmerman as "modernization of the Washington telephone system and a fair deal for both telephone user and supplier." He declared that telephone rate structure in this state was established in 1919 & no major changes in rates have been made since 1924. Mr. Zimmerman stated that as in other fields, costs have risen sharply & capital investment needs have multiplied as new & better telephone services were demanded; result has been that in recent years company has not received fair return on its investment as required by state law.

* * *

FCC scheduled hearing for Dec. 18 on application of Southwestern Bell Tel. Co. to acquire exchange plant of Marion (Kans.) Mutual Telephone Co. Marion company & Southwestern Bell both operate in & adjacent to town of Marion, with Independent company's operations being mainly concerned with rural lines. Cost of proposed acquisition is $7000. This acquisition will eliminate present dual service.

* * *

Highlights: Associated Tel. Co., Ltd., Santa Monica, Calif., installed its 250,000th telephone, Nov. 25....Southeast Missouri Tel. Co. purchased Burfordville (Mo.) Tel. Co....Northeastern Tel. Co. installing new swbd. in Barbourville, Ky....Farmers Tel. Co. rebuilding lines into Falun, Minn.

Ray Smith

Ray W. Smith, Editor

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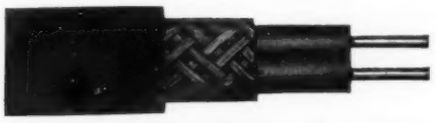
—is synonymous with ENDURING ADHESION in *Long Life* Telephone Wires

Manufactured by Whitney Blake

These Wires have TELEPLATED* Conductors

TELEPRENE { DROP WIRE *and* BRIDLE WIRE } ● **WEATHERPROOFED** { DROP WIRE *and* BRIDLE WIRE }



No. 17 BRONZE PARALLEL REINFORCED TELEPRENE DROP WIRE — CAT. No. 17TBP-R

No. 17 BRONZE TWISTED PAIR TELEPRENE DROP WIRE — CAT. No. 17TB2

No. 18 SOFT COPPER TWISTED PAIR TELEPRENE BRIDLE WIRE — CAT. No. 18TBC2 ALSO TRIPLE CONDUCTOR — CAT. No. 18TBC3

No. 17 BRONZE PARALLEL BRAIDED DROP WIRE — CAT. No. 17BP

No. 17 BRONZE TWISTED PAIR BRAIDED DROP WIRE — CAT. No. 17B2

No. 18 OR 20 SOFT COPPER TWISTED PAIR BRAIDED BRIDLE WIRE — CAT. No. 18B2 ALSO TRIPLE CONDUCTOR — CAT. No. 18B3

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New Haven, Connecticut, U.S.A.

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DURABLE, WEATHER-RESISTANT NEOPRENE

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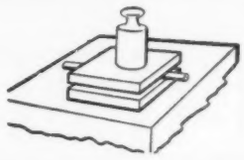
MAKE THESE TESTS YOURSELF

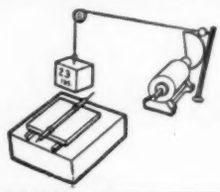
Pressure increased to point of failure



1. COMPRESSION TEST

See how the neoprene-jacketed wire stands up when crushing pressure is applied.

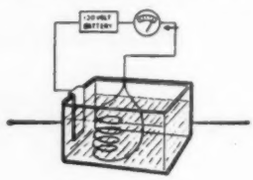
25 blows per minute, 6½-inch drop



2. POUNDING TEST

See how long it takes to crush a neoprene-jacketed wire when weight is dropped on wire repeatedly. Shows the ruggedness of neoprene for tough installations.

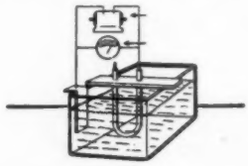
120-volt battery and galvanometer



3. INSULATION TEST

See how little leakage there is when neoprene-jacketed wire is immersed in water. Shows the better electrical properties of wet drop wire when neoprene jackets are used.

High-voltage generator and voltmeter



4. BREAKDOWN TEST

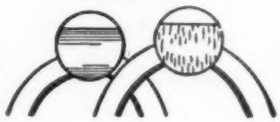
See how much voltage you can apply to neoprene-jacketed wire immersed in water before failure.

Du Pont vertical tube flame test

5. FLAME TEST

Prove to yourself that neoprene does not propagate flame in this Underwriters test. Shows why neoprene will not carry a flame into a building.

Exposed under strain to sunlight, weather



6. WEATHER TEST

See how neoprene stands up under sunlight, temperature changes or smoke and chemical fumes. Long-term tests show neoprene jacket is in good condition after ten years of service.

RUBBER CHEMICALS DIVISION, M-12

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EDITORIAL

Merry Christmas!

WE realize that our Christmas salutation may reach you a bit early. But, since this is the last issue of this publication before Christmas, we must say it now or not at all. And we want to say it.

We hope that this Christmas season will be a merry one, and a happy one, for you and all those dear to you. Certainly everyone is entitled to a bit of merriment and happiness on this greatest of all celebrations, after all the cares and trials of the year we are now ending.

And, since this is our last issue of this year, we express to you now our sincere hope that the new year now almost upon us will be a happy and prosperous one for you.

We know that it is not customary to mix business with holiday salutations, but there are a few things—somewhat in the nature of unfinished business—that we need to get off our mind.

The telephone industry made considerable progress in a number of directions during 1947. Installations of telephones probably exceeded those of any preceding year. Additions to equipment and plant facilities, both exchange and toll, have been very large. There has been substantial improvement in service at many places. Exchange rates more in keeping with the present high level of expenses, have been obtained by a number of companies. The integration into the telephone industry of many war and postwar developments for communication is taking place rapidly. The farm telephone situation is much improved. Valuable and lasting progress has been made in other important things. But—

There is still a considerable number of Independent telephone companies that have not undertaken the very necessary proposition of increasing their exchange rates to meet present high expense levels.

In consequence, income of these companies for 1948 will in many cases be inadequate to improve service or even to maintain satisfactory service.

Regulatory bodies are becoming impatient with the service situation at some places—this impatience will extend and grow in 1948 unless the managements of companies subject to it can show that they are doing everything reasonably possible to correct the situation.

Financing required for needed additions to equipment and plant will probably not be done so easily, or as cheaply, in 1948 as in past months, and it will be much more selective—available, that is, most easily in those cases where management is most progressive and alert.

The unprecedented heavy demand for telephones will doubtless continue unless and until there is a falling off in employment, which does not seem to be in sight now. To fully meet such demands will necessitate unprecedented additional investment in equipment and plant. Unless reasonable and sensible selectivity is used in filling the many held orders, telephone companies will find themselves with much useless and nonproductive plant if and when recession comes. Boom growth is dangerous in the telephone business.

These are a few, but of course not all, of the problems the telephone industry will carry over into the new year. The prosperity of the telephone industry in 1948 will depend to a considerable extent upon its ability to meet these problems successfully.

MERRY CHRISTMAS AND HAPPY NEW YEAR!

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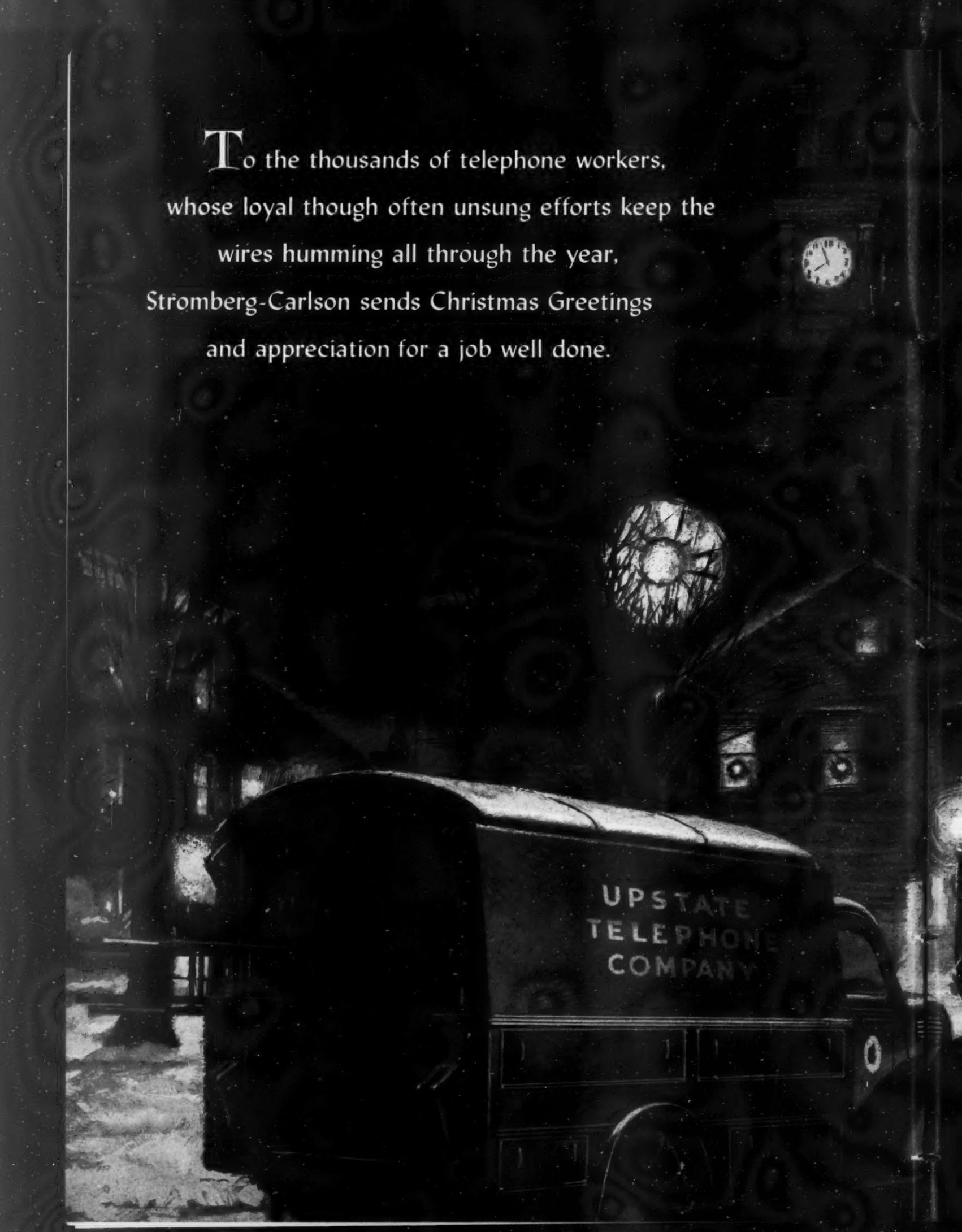
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whose loyal though often unsung efforts keep the
wires humming all through the year,
Stromberg-Carlson sends Christmas Greetings
and appreciation for a job well done.
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